TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS

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DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled **"TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS"** submitted towards partial fulfillment of the requirements for the award of **MS GENERAL SURGERY** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Amandeep Singh Nar,** Associate Professor, Department of Surgery, **Dr. Atul Mishra**, Professor, Department of Surgery. **Dr. Ravinder Pal Singh**, Professor, Department of Surgery. No part of this thesis has formed the basis for the award of any degree previously.

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Dedicated

to

my family

&

Teachers

LIST OF ABBREVIATIONS

ABG : ARTERIAL BLOOD GAS
B/L : BILATERAL
BLD DSRD : BLOOD DISORDER
BT : BREATHLESSNESS
CECT : CONTRAST ENHANCED COMPUTED TOMOGRAPHY
COPD : CHRONIC OBSTRUCTIVE PULMONARY DISEASE
CT : COMPUTED TOMOGRAPHY
FEV1 : FORCED EXPIRATORY VOLUME IN 1 SECOND
FVC : FORCED VITAL CAPACITY
ICD : INTER COSTAL DRAIN
LT : LEFT
OT : OPEN THORACOTOMY
PaCO2 : PARTIAL PRESSURE OF CARBON DIOXIDE IN ARTERIAL BLOOD
PaO2 : PARTIAL PRESSURE OF OXYGEN IN ARTERIAL BLOOD
POD : POST OPERATIVE DAY
POST OP : POST OPERATIVE
PRE OP : PRE OPERATIVE
RT : RIGHT
TB : TUBERCULOSIS
VATS : VIDEO ASSISTED THORACOSCOPIC SURGERY
PPE : PARAPNEUMONIC EFFUSION
SP : SPONTANEOUS PNEUMOTHORAX
VATD : VIDEO ASSISTED THORACOSCOPIC DECORTICATION
OD : OPEN DECORTICATION
VAS : VISUAL ANALOGUE SCALE
ET : EMPYEMA THORACIS
UPPE : UNCOMPLICATED PARAPNEUMONIC EFFUSION
CPPE : COMPLEX PARAPNEUMONIC EFFUSION
TT : TUBE THORACOTOMY

HTN : HYPERTENSION

IHD : ISCHEMIC HEART DISEASE

DIAB : DIABETES MELLITUS

LOS : LENGTH OF STAY

ABSTRACT

Introduction: Empyema thoracis is defined as the collection of purulent fluid in the pleural space. Pus in the pleural space can't be coughed out. Instead, it needs to be drained by a needle or surgery**.**

Aim of Study: To study clinical profile and outcomes of video assisted thoracoscopic decortication in patients of empyema thoracis.

Materials & methods: This study will be conducted in department of surgery, Dayanand Medical College and Hospital for one and a half year. All the patients will be informed about the procedure of VATS in detail and surgery will be performed after taking written and informed consent from each patient. Relevant present and past history will be recorded. Intraoperative and post operative data will be collected for all patients and data will be recorded in proforma for analysis and interpretation of data.

Results: 43 patients were included in the study. In four patients VATS procedure was converted to open thoracotomy. Mean blood loss in VATS procedure was 61.05 ml and mean duration of surgery was 75.35 min. Prolonged air leak was found in 3 patients out of 43 patients. Wound complications was not found in any of the patient. Pain decreased significantly in the post op period from day 0 to day 3. FEV1, FVC, FEV1 /FVC, dyspnea index, chest × ray, pao2 and paco2 improved significantly following VATS procedure.

Conclusion: VATS procedures are safe, feasible and efficacious in patients with empyema thoracis**.**

Key words: Empyema thoracis (ET), Video assisted thoracoscopic surgery (VATS), pulmonary fuction test(PFT), parapneumonic effusion (PPE)

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Dr. Gurkaran Singh

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INTRODUCTION

Every year, 1 million individuals with pneumonia are hospitalised in the United States; between 20% and 57% of these patients acquire a PPE. Although PPEs are very common, the collection of pus in the pleural space, known as empyema, is less frequent, occurring in 5%–10% of PPE patients.[1] A practical, clinical categorization of PPE is as follows: (1) an uncomplicated parapneumonic effusion (UPPE) resolves with antibiotic treatment alone, without pleural space sequelae; (2) a complex parapneumonic effusion (CPPE) needs pleural space drainage to relieve pleural sepsis and avoid development to an empyema; and (3) empyema develops as the last stage of a PPE.[1]

Empyema is described as pus in the pleural cavity, which often results from pneumonia or chest trauma[2] and may also develop as a consequence of any thoracic surgery. It is an opaque, yellowish-white, viscous fluid caused by serum coagulation proteins, cellular debris, and fibrin deposition. Empyema often arises as a result of a patient's delayed presentation with growing pleural infection and severe pneumonia, while it may also occur less frequently as a result of ineffective clinical management. Early antibiotic therapy stops the spread of pneumonia, the development of a PPE, the development of a UPPE, and the progression of empyema.[1]

Pneumonia is often followed by three stages of empyema:

1. The exudative phase is characterised by protein-rich effusion. If this gets infected, then empyema is imminent. Antibiotics could be all that is needed at this point. Additionally, aspiration or drainage to dryness is preferable.

2. The fluid thickens throughout the next days to reach the fibro purulent phase. Given that antibiotics alone are unlikely to be curative at this point, drainage is appropriate.

3. The lung may get caught by a thick peel or cortex as a result of the organising phase, which may need surgical care.[3]

Throughout the first half of the 20th century, there was a considerable decline in the prevalence of empyema. Empyema was a complication of 5% of pneumonia cases in the pre-antibiotic period, but with the introduction and widespread use of antibiotics in the 1940s, the rate of empyema declined to 2% of pneumonia cases. However, this pattern shifted in the 1990s, and the prevalence of empyema in the United States has been raising ever since.[2]

Age is a risk factor for empyema, which is more common in children and elderly. Other risk factors include debilitation, male sex, pneumonia necessitating hospitalisation, and comorbid disorders such bronchiectasis, chronic obstructive pulmonary disease, rheumatoid arthritis, alcoholism, diabetes, and gastroesophageal reflux disease. The issue is made more challenging by the increased percentage of patients who have several comorbidities and old age. Patients who are elderly are significantly more commonly affected.[4] Comorbid illnesses, such as chronic heart, kidney, liver, or respiratory diseases, persistent drinking, and smoking are thought to be important risk factors in addition to old age.[4]

Since a PPE is a sign of more advanced pneumonia, the morbidity and mortality of pneumonia rise when a patient has one. According to reports, the death rate for patients with empyema ranges from 5% to 30%, depending on the associated conditions present.[1,5] The death rate among immunocompromised hosts might reach 40%. The combination of clinical, microbiological, laboratory, and radiographic evidence was always necessary for the diagnosis of pleural empyema. In line with the triphasic character of pleural empyema and the commonly recognised worldwide categorization, three illness phases were developed, and each patient was assigned to one of these groups.[4]

The following diagnostic criteria was accepted for thoracic empyema:

1. Gram-stained (direct) or culture-proven organisms or frank pus at tapping (indirect).

2. pH less than 7.2, glucose level of fluid less than 400 mg/l, LDH more than 1000 IU/ml, protein level greater than 3 g/ml, and WBC greater than 15,000 cells/mm3.

3.Physical, radiological, and laboratory signs that accompany the pertinent clinical picture.

Imaging modalities such as chest X-ray, fluoroscopy, chest ultrasonography, and CT all play an essential role, but fundamental approaches like as physical examination, (guided) tapping, and specimen analysis are of paramount significance.[6]

Recent research indicates that the use of a chest tube as the first therapy requires additional investigation.[7] In 2018, a cohort research described the increased odds of readmission and reintervention among patients with thoracic empyema treated with chest tubes and recommended early surgical intervention.[7]The basic treatment objective – pus removal if present — has not altered since the time of Celsus. Empyema has been treated with a variety of surgical procedures, including Video Assisted Thoracoscopic Decortication, open thoracotomy and decortication, thoracoplasty, and open window thoracostomy.[6] The success rate of a series is higher when there are more Stage I cases in it. The reduced effectiveness of the treatment in trauma-related empyema thoracis is a result of the large number of Stage III cases and younger patients with low risk.[6]

Since the mid-1990s, Video-Assisted Thoracoscopic Surgery for Decortication has gained popularity, and its success rate varies from 68% to 93%. Video-assisted thoracoscopic surgery is increasingly employed for a variety of thoracic operations, such as the treatment of recurrent pneumothorax, pleural effusions, hyperhidrosis etc. When effective, VATS resulted in less postoperative pain and a shorter length

of hospitalisation than thoracotomy.[8] The success rate of VATS decortication is highly dependent on the stage of parapneumonic effusion (PPE), with the failure rate increasing as the number of patients in the organising phase increases.[6]

When the underlying lung is unable to expand owing to a thick inflammatory peel and the patient is suitable for major surgery, decortication is the treatment of choice. It has been shown that decortication significantly increases both vital capacity and forceful expiratory volume in the first second. Thoracoplasty involves remodelling the osteomuscular wall of the thoracic cage in order to regulate the underlying inflammatory process, however it is rarely performed nowadays.[6] When thoracoplasty is not an option and VATS has failed to manage the condition, open window thoracostomy is done on debilitated individuals. It may be performed as a definitive operation with the purpose to cure, as a technique of last resort after earlier treatments have failed to establish a generally stable condition, or as a preliminary procedure prior to definitive therapy. In the treatment of complex parapneumonic effusion and empyema, video-assisted thoracoscopic surgery (VATS), which plays a bridging role between medical and aggressive surgical treatments, has assumed greater importance.[9] In the last decade, technological developments in video endoscopy have permitted the reintroduction of thoracoscopy in the form of video assisted thoracoscopic surgery (VATS) with significantly wider clinical applications.[10]

VATS is a safe and successful method for treating complicated parapneumonic effusion or empyema. When treating difficult parapneumonic effusion or empyema with VATS, earlier intervention may provide better outcomes. To determine the appropriate time and settings for VATS therapy of complex parapneumonic effusion or empyema, more prospective, randomised, or controlled trials are necessary.[9] The recent development of tilted video-optical endoscopic equipment and more effective endosurgical instruments has enlarged the use of VATS operations to include a broader range of thoracic

surgical conditions that previously required thoracotomy.[9,11-12] Development of micro cameras and rod lens technology permitting a panoramic view of the hemithorax (instead of the previous tunnel-like vision); evolution of general anaesthetic technique to permit one lung ventilation, thereby allowing free manoeuvrability of the telescope and instruments within the pleural cavity; and availability of specialised endoscopic surgical instruments have all contributed significantly to the transformation.

Many surgeons now consider VATS to be the gold standard for the surgical therapy of thoracic disorders such as empyema thoracis, spontaneous pneumothorax, and pleural illnesses. Video-assisted thoracoscopic surgery (VATS) is a minimally invasive procedure used to diagnose and treat chest conditions. During a VATS surgery, a tiny camera (thoracoscope) and surgical equipment are placed via one or more small incisions in the chest wall and into the chest cavity. The thoracoscope sends pictures of the chest's interior to a video display, therefore directing the surgeon throughout the surgery. After the failure of chest tube thoracostomy, VATS decortication has been proven to be successful for empyema thoracis stages II and III.[10] In addition, its efficacy in treating multiloculated and chronic empyema has been examined. There is growing evidence that VATS is a safe and practical procedure linked with better perioperative results than standard open thoracotomy.[13]

Therefore, we proposed a study to evaluate the clinical profile and outcomes of video-assisted Thoracoscopic decortication in patients with empyema thoracis.

AIM AND OBJECTIVES

To study clinical profile and outcomes of Video Assisted Thoracoscopic Decortication in empyema thoracis.

REVIEW OF LITERATURE

VATS surgeons worldwide usually credit Swedish physician Hans Christian Jacobeus with the invention of thoracoscopic treatment (Jacobaeus, 1910).[14] In 1910, H.C. Jacobaeus published the first version of "Concerning the Possibility of Using Cystoscopy in the Examination of Serous Cavities" in Stockholm. He performed laparoscopy and thoracoscopy using the same equipment in order to examine the pleural cavity in cases of pleurisy. In the late 19th century, he initially examined the pleural cavity under local anaesthesia using a modified cystoscope. Using a modest candle as a source of illumination, Jacobaeus gazed through the stiff tube into the chest.[14] However, technical improvements in videoendoscopy during the last decade have made possible the reintroduction of thoracoscopy in the form of video-assisted thoracoscopic surgery (VATS) with far broader clinical uses.[15] The development of microcameras and rod lens technology allowing a panoramic view of the hemithorax (instead of the previous tunnel-like vision); the evolution of general anaesthetic technique to permit one lung ventilation, thereby allowing free manoeuvrability of the telescope and instruments within the pleural cavity; and the availability of specialised endoscopic surgical instruments are the advancements that were instrumental in the transformation.[15]

Many surgeons now consider VATS to be the gold standard in the surgical treatment of thoracic disorders such as spontaneous pneumothorax (SP), pleural diseases, and indeterminate lung nodules.[15] Open procedures (often axillary or lateral thoracotomy) or minimum access VATS may be used to get surgical access for the treatment of pneumothorax. The efficacy of VATS in the treatment of pneumothorax has prompted physicians to refer patients earlier and patients to accept surgery more readily.[16] Prior data indicates that senior (75 years or older) individuals undergoing VATS treatments had a low incidence of postoperative pulmonary problems. In addition, VATS may be a beneficial technique for a number of endoscopic

operations in a subset of paediatric patients.[15]There is growing evidence associating VATS with reduced access trauma and a speedier recovery, with many recognising that access trauma is often worse than the surgery for correction.[15-16]

It is well acknowledged that the cytokine network plays a crucial role in initiating the acute phase inflammatory and immunologic response to surgical trauma. Several laparoscopic operations have been linked with reduced cytokine release relative to their open equivalents.[17] Postoperative proinflammatory cytokine levels were shown to be lower, and T cell subgroups and natural killer cells were less inhibited after VATS compared to their open counterparts.[17,18] Moreover, individuals who had VATS needed much less postoperative parenteral opioids and pain medications than those who underwent open surgery.[16,19]

The minimally invasive surgical technique VATS, which was first employed for diagnostic reasons, is now a days used for therapeutic purposes as decortication for empyema thoracis.[10] Multiple studies have shown that VATS decortication delivers superior results compared to Tube Thoracostomy with equal outcomes in terms of illness resolution compared to open surgery. In addition, VATS reduces the duration of hospital stay, post-operative problems, and patient morbidity, and should be considered before an open procedure for patients with chronic empyema who are surgical candidates.[20] However, other studies have also shown that VATS decortication is at least comparable to open decortications in terms of symptom relief due to advancements in surgical techniques and experience with VATS.[20]

Several studies have shown that VATS is beneficial for empyema thoracis in its early stages (Fibrinopurulent stage or stage II). However, Waller and Rengarajan (2001) showed that this treatment might be helpful even in the advanced stages of empyema. The benefits of VATS over open decortication include less post-operative discomfort, a shorter hospital stay, less blood loss, a quicker recovery of pulmonary

function, a lower incidence of wound infection, and a lower 30-day death rate. Even in the advanced stages of empyema thoracis, VATS remains an important diagnostic tool for determining the stage of the illness and planning the ultimate treatment approach.[21] In empyema thoracis, early intervention with VATS drainage or decortication has shown better outcomes than extended conservative care with ICD installation or fibrinolytics.[22] This is because early interventions may prevent the fast advancement of the illness.

VATS decortication has been one of the most significant and successful minimally invasive therapeutic modalities for cases of stage I and II empyema thoracis in recent years. According to a research by RavikantThori et al.[23], surgical intervention for late-stage empyema thoracis with VATS decortication provides benefits in terms of a shorter hospital stay, less postoperative discomfort, and a low complication rate, as well as a better prognosis and faster recovery.[23] After failure of conservative treatment, excellent results and decreased recurrence rates are connected with VATS drainage and pleurectomy. VATS decortication may be favoured in stages II and III empyema thoracis due to favourable results and lower morbidity and death rates. In stage III empyema, the timing of VATS decortication is crucial to reducing conversion rates and accelerating recovery. The conversion rate of VATS decortication to open thoracotomy will continue to decline as experience, surgical skills, and anaesthesia techniques improve. The fact that a general anaesthetic is not required is a distinct benefit of the VATS technique. This is especially crucial for unstable individuals with numerous comorbidities or people allergic to general anaesthesia. Rare cases have shown that VATS decortication may be used to successfully treat empyema in conscious patients with epidural or paravertebral nerve block.[24-25] It was also hypothesised that spontaneous lung ventilation made dissection simpler during surgery, hence reducing post-operative morbidity.

Lawrence DR, Ohri KS, Moxon RE, Townsend ER, and Fountain SW (1997)[8] determined that the predominant therapy for empyema thoracis continues to be intercostal tube drainage in conjunction with antibiotics. Until recently, failure of first therapy was a justification for thoracotomy and decortication. The addition of video-assisted thoracoscopic decortication (VATD) to the current therapeutic options need validation. Over the course of three years, 44 patients who came for surgical treatment of empyema thoracis were analysed retrospectively. According to the findings, two patients were ineligible for VATD and required open decortication (OD). VATD was used to effectively treat thirty individuals. Two patients were converted to OD during the first surgery, whereas ten patients needed a second OD treatment. Mean preoperative symptom duration was 37.6± 11.8 days (VATD) and 40.1 ±1.6 days (OD) prior to referral (p value not significant). Prior to transfer, the mean length of hospitalisation was 13.7± 2.4 days (VATD) and 11.5 ±3.4 days (OD). The duration of intercostal drainage was 4.0± 0.3 days (VATD) and 8.5± 2.0 days (OD) (p 0.004). The postoperative hospital stay was 5.3± 0.4 days (VATD) against 10.3 ± 2.1 days (OD) (p= 0.001). The authors concluded that all patients with pleural empyema, regardless of the duration of symptoms, should be evaluated for primary surgical treatment with VATD. This strategy does not prohibit OD as a secondary procedure or conversion to OD after first thoracoscopic evaluation. The primary benefits of VATD over OD include a shorter length of postoperative intercostal drainage and a shorter postoperative hospitalisation.

KlenaJW, Cameron BH, Langer JC, Winthrop AL, Perez CR (1998)[26] determined the relation between the timing of VATD and its ability to prevent the requirement for open decortication. In two tertiary pediatric facilities between 1994 and 1997, 21 children aged 3 to 16 years (mean, 8 years) with symptomatic, loculated, parapneumonic empyema were treated with VATD. The preoperative length of symptoms, hospitalization, and previous requirement for thoracostomy drainage were compared between patients who underwent VATDalone

and those who required a thoracotomy and decortication. The Wald chi-square test or Fisher's exact test was employed for statistical analysis, and $p<0.05$ was considered significant. In 15 patients (group 1), video-assisted thoracoscopic debridement was successful, while in six patients (group 2), a thoracotomy and decortication were required. Group 1 had a shorter mean duration of preoperative symptoms (13 days against 27 days; $p= 0.03$), a shorter median length of preoperative hospitalization (6 days versus 18 days; $p = 0.04$), and a lower incidence of previous thoracostomy drainage (4/15 versus 5/6; $p= 0.05$). The study revealed that VATD is more likely to be effective when performed within one week of the diagnosis of loculatedparapneumonic empyema.

LuhSP , Chou MC , Wang LS , Chen JY , Tsai TP (2005)[9] examined the use of video-assisted thoracoscopic surgery (VATS) to treat complex parapneumonic effusion and pleural empyema. At a retrospective study conducted in Taiwanese medical centers, it was determined that there was no significant difference between the two groups. Between May 1995 and December 2003, a total of 234 patients (108 women, 126 men; median age, 51 years; range, 0.75 to 84 years) underwent surgeries for parapneumonic effusion (145 patients) or pleural empyema (89 patients). All patients got preoperative chest radiographs, and 188 patients (80.3%) undergo CT or sonography. More than 85 percent of patients (200) had diagnostic or therapeutic thoracentesis, tube thoracostomy, or fibrinolytics prior to surgery. Empyema resistant to medical treatment or peel or multiloculated exudates per CT and chest tapping were among the indications for VATS. The study found that the mean standard deviation of procedure duration was 64.3± 22.5 minutes (range, 26 to 244 min). Sixteen patients (6.8%) with empyema required additional surgery (9 patients required open drainage or thoracoplasty, and 7 patients needed redecortication or repair of bronchopleural fistula). There were no intraoperative deaths and just eight (3.4%) perioperative deaths (30 days), which were unrelated to surgery in the majority of

cases. Among the 234 patients treated with VATS, 202 (86.3%) received good outcomes. Patients requiring open decortication or repeat procedures (n = 40) had a longer mean duration of preoperative symptoms, a longer mean period of preoperative hospitalization, and a greater incidence of pleural empyema than patients receiving simple VATS. The conclusion of the study was that VATS is a safe and effective method for treating complex parapneumonic effusion and pleural empyema. The appropriate timing and settings for VATS therapy of complex parapneumonic effusion and pleural empyema should be determined by a prospective trial.

Ng CS, Lee TW, Wan S, Wan IY, Sihoe AD, Arifi AA, et al (2005)[19] Examined the postoperative leukocyte, lymphocyte subsets, B-cell, T-cell, and NK-cell responses of NSCLC patients having lung resection to VATS or thoracotomy. Over the course of three months, 21 patients with resectable primary NSCLC were randomly randomized to have VATS or thoracotomy. Blood samples were drawn preoperatively and on postoperative days (POD) 1, 3, and 7 for flow cytometry analysis of total leukocytes, B cells, NK cells, lymphocytes, total T cells, and T4 and T8 cell counts. No demographic disparities existed between the two groups. The outcomes of the present investigation demonstrated, Compared to preoperative levels, the total number of white blood cells was considerably higher at POD 1, 3, and 7 in all patients. T8 cells and NK cells were considerably reduced in both groups at POD 1, but total T cells, T4 cells, and lymphocytes were significantly reduced only in the thoracotomy group. At POD 7, the thoracotomy group had significantly lower NK cell counts than the VATS group. B cells showed no intra- or intergroup differences that were statistically significant. There were no significant differences between the two groups in terms of survival or disease-free survival. Thus, the study showed that VATS major lung resection for NSCLC is associated with reduced postoperative immunosuppression as well as a speedier recovery from immunosuppression. Large randomized trials are required to prove the

therapeutic significance of better retained cellular immunity in the early postoperative period.

WurnigPN, Wittmer V, Pridun NS and Hollaus PH (2006)[27] gained extensive expertise with video-assisted thoracic surgery (VATS), became familiar with its benefits, and began using it to treat thoracic empyema. They treated 130 patients with pleural empyema for whom chest tube drainage and antibiotic therapy had not been effective. Six months after surgery, a clinical and radiologic evaluation and lung function test were performed. On every patient, video-assisted surgery was conducted. Mean operating time was 93 minutes (range, 55 to 180 minutes), mean chest tube drainage length was 10 days (range, 5 to 32 days), and mean hospital stay was 16 days (range, from 3 to 56 days). The percentage of conversion to open thoracotomy was 3.1%, according to the results. In 9% of patients, complications necessitating additional surgery occurred. At six-month follow-up, the average forced expiratory volume in 1 second ranged from 69.5% to 105.9%, while the average postoperative vital capacity ranged from 59.9% to 97.9%. No postoperative or procedure-related deaths occurred. The conclusion of the study was that Video-assisted thoracic surgery is a safe and effective therapeutic option for fibropurulent empyema with a minimal risk of morbidity and death. To ensure a positive outcome, it may be required to convert to thoracotomy to remove all fibropurulent material and accomplish complete lung expansion.

Bilgin M, Akcali Y, Oguzkaya F (2006)[28] the early use of video-assisted thoracoscopy was intended to reduce hospitalization duration and avert a thoracotomy. Between January 1997 and June 2004, seventy individuals with parapneumonic empyema were examined prospectively. Randomly, the patients were divided into two groups. In group I (n = 35 patients), chest tubes were placed after pleural material was drained and fibrins were debrided through video-assisted thoracoscopic surgery. In group II (n = 35 patients), tube thoracostomy was performed without the use of a thoracoscope with video assistance. In terms of hospitalization time, open surgery for

decortication, and complications, both groups were compared. According to the data, there was no statistically significant difference between the groups in terms of age and gender (P > 0.05). In group I, 17.1% of patients got open decortication, while 37.1% of patients in group II underwent the same surgery (P <0.05). In group I, the average hospital stay was 8.3 days (range, 7–11 days); in group II, it was 12.8 days (range, 10–18 days; P< 0.05). One bronchopleural fistula and one death occurred in group I, and one bronchopleural fistula and one death occurred in group II. The study concluded that Video-assisted thoracoscopic evacuation and chest tube insertion is a new therapeutic approach for pleural empyema that shortens hospital stay and reduces the necessity of open decortication.

Sahn SA (2007)[1] assessed the outcome of parapneumonic effusions in relation to the time between the development of clinical symptoms and presentation to the physician, comorbidities, and prompt therapy. Early antibiotic treatment typically reduces the formation of parapneumonic effusions and their progression to PPE and empyema. The examination of pleural fluid offers diagnostic information and guides further therapy. If the PPE is small to moderate in size, nonpurulent, and free-flowing ,antibiotic treatment alone is highly likely to be beneficial. The presence of persistent pneumonia symptoms prior to examination, pleural fluid with a pH of 7.20, and loculated pleural fluid indicate the need for pleural space draining. Aspirated pus (empyema) from the pleural space invariably necessitates drainage. In the early stages of fibrinolysis, fibrinolytics are most likely to be effective and may render surgical drainage unnecessary. Immediately do video-assisted thoracic surgery if pleural space draining is inadequate

Molnar TF (2007)[6] analyzed the most recent literature on treatment options for adult thoracic empyema in an effort to identify the issues and determine where consensus exists. Using the Oxford Center for Evidence-Based Medicine's criteria, the roles of surgical drainage, lavage methods, debridement via VATS, decortication, thoracoplasty,

and open window thoracostomy were evaluated. In light of the triphasic nature of empyema thoracis, the functions of several therapy methods were understood. Randomized controlled experiments yielded contradictory findings. The absence of a single optimum treatment technique or policy reflects the difficulty of this disease's diagnosis and staging. Drainage, various evacuation procedures, decortication, thoracoplasty, and open window thoracostomy are well-established technical modalities; nonetheless, there is neither a generally approved main modality nor a gold standard for their sequence. Drainage remains the first-line treatment for Phase I diseases. In the fibrinopurulent phase, VATS decorticationt is safe, dependable, and effective. Organised pleural callus requires formal decortication. Open window thoracostomy is a straightforward, safe, and rapid detoxication surgery for high-risk patients. Thoracoplasty maintained its final role in pleural space management. Acute postoperative bronchial stump insufficiency necessitates prompt surgical intervention.Evacuation of toxic material is mandatory. No single-step method provides a solution. Considering the triphasic character of development of thoracic empyema, decision-making requires a triad composed of the etiology of empyema (primary vs. secondary), the overall health of the patient, and the stage of disease. On the basis of institutional practice and regional protocols, individualized ways may be suggested. In general, thoracic empyema appears resistant to fitting completely into the categories of evidence-based medical practice.

Chan DT, Sihoe AD, Chan S, Tsang DS, Fang B, Lee TW, Cheng LC (2007)[29] Compared the outcomes of surgical decortication for empyema thoracis performed with VATS and thoracotomy in terms of radiologic resolution, functional improvements, and postoperative morbidity, as well as patient satisfaction. 77 consecutive patients were treated for empyema thoracis at two university teaching hospitals over the course of five years. The surgical strategy chosen was determined by surgeon preference. The preoperative and postoperative therapy of empyema in all patients was same. A radiologist who was blinded to

the surgical technique assessed postoperative radiologic improvements. An average of 36 months after the surgical surgery, functional improvements were evaluated using a questionnaire. In 41 patients, VATS was utilized, whereas thoracotomy was performed on 36 patients. The results indicated that both groups of patients had comparable demographic and clinical characteristics prior to surgery. Empyema did not necessitate conversion from VATS to thoracotomy or reintervention in any patient. In both groups, intraoperative blood loss, duration of chest drain, hospital stay, and postoperative complication rates were comparable. Significantly lower operation times were seen in the VATS group (2.5 versus 3.8 hours, $p< 0.001$). Both methods of decortication resulted in comparable postoperative radiologic and functional improvements. The 21 patients who had the VATS technique reported considerably reduced postoperative discomfort ($p = 0.04$), more satisfaction with the wounds ($p< 0.0001$), and greater overall satisfaction with the procedure ($p = 0.006$), compared to the 42 patients who were available for follow-up. The authors found that VATS permits decortication of empyema as effectively as thoracotomy. However, the VATS technique reduces patient discomfort and increases patient acceptance.

Drain AJ, Ferguson JI, Sayeed R, Wilkinson S, Ritchie A (2007)[10] described how 2-window video-assisted thoracoscopic decortication and lung mobilization can be used to effectively treat stage III empyema. 52 patients with stage III empyema utilized this treatment. No additional ports or thoracotomy was required. Three patients (6%) required CT-guided drainage of persistent big loculi, but no further surgery was required. No patient required conversion to thoracotomy following VATS decortication and lung mobilization with the two-window approach. Five patients (14%) had active pleural infection, as proven by culture of intraoperative pleural fluid samples. The mean duration of postoperative thoracostomy drainage was 3.9 days (range: 2–10 days; median: 4 days), while the median length of stay in the hospital was 10 days. There were no deaths within thirty days of

surgery. Three patients (6%) required CT-guided drainage of persistent big loculi, but no additional surgery is required. Six weeks after surgery, chest radiography confirmed complete lung expansion and clearance of pleural collection in the remaining 49 patients (94 percent). The findings of this study suggest that Two-window VATS decortication and lung mobilization may contribute to the evolution of thoracic surgery. The author's experience highlights the necessity for a standardized measurement of the patient benefit of the standard versus the 2-window treatment indicated for stage III empyema. In addition, despite a recent experiment examining the use of streptokinase in the treatment of early-stage empyema, there are no published randomized trials on the surgical treatment of empyema. A prospective randomized controlled trial should compare video-assisted thoracoscopic surgery to the best medical therapy for early-stage empyema and to various surgical techniques for stage III empyema.

Wozniak CJ, Paull DE, Moezzi JE, Scott RP, Anstadt MP, York VV, et al (2009)[22] established if the initial method, simple drainage (tube thoracostomy, pigtail catheter) or operation video-assisted thoracoscopic surgery [VATS], thoracotomy, was related to outcomes in the management of empyema. 104 consecutive individuals with empyema were surveyed for data collection. The primary results were additional procedures and mortality. Age, delay, Karnofsky performance status (KPS), Charlson comorbidity index (CCI), serum albumin, malignancy, Acute Physiology and Chronic Health Evaluation II score, loculations on computed tomography scan, empyema stage, and first procedure selection were included as predictor variables. The results of the present investigation revealed that 84% of patients had advanced empyema (> stage IIA). Overall treatment success rates (no deaths, no extra drainage surgeries) were 40% (4 of 10) for pigtail drainage, 38% (14 of 37) for tube thoracostomy, 81% (13 of 16) for VATS, and 89% (32 of 36) for thoracotomy. Five individuals received miscellaneous operations. KPS, CCI, and drainage as the initial procedure are univariate variables related with hospital mortality. In

multivariate analyses, KPS (coefficient, -0.06, p=0.002) and failure of the initial procedure (odds ratio [OR], 6.76; 95% confidence interval [CI], 1.45 to 31.4, p=.01) were independently associated with mortality. Simple drainage as the initial technique was a substantial, independent predictor of failure of the first surgery (OR, 11.1; 95% CI, 3.51 to 34.8; p=.00004; Figure 1). Even after adjusting for confounding variables, the authors concluded that the choice of the initial approach for empyema treatment is crucial to the result. As initial treatment for advanced empyema, VATS or thoracotomy is associated with better outcomes.

Shahin Y, Duffy J, Beggs D, Black E, Majewski A (2010)[21] reviewed the surgical management of postpneumonic empyema (primary empyema) and assessed the outcomes of patients who underwent various surgical treatment modalities based on the clinical stage of empyema. The authors retrospectively examined 106 patients who underwent surgical treatment for pleural empyema over a three-year period beginning in August 2005. They found 81 patients (76%) with primary empyema (58 males, mean age 52 years) and 25 patients (24%) with secondary empyema. Analyses was conducted on the first group of patients with primary empyema. 29 patients (36%) had stage II empyema, whereas 52 patients (64%) had stage III empyema. 28 patients with stage II empyema had thoracoscopic debridement, whereas one patient underwent open thoracotomy and debridement. The mortality rate for all surgeries was 0%. The median length of hospital stay for thoracoscopic debridement was six days, for Thoracoscopic decortication it was five days, and for open decortication it was eight days. The study found that patients treated with video-assisted thoracoscopic surgery (VATS) debridement or decortication spent less time in the hospital, and the conversion rate to open procedure for stage III empyema was only 19%, which suggests that VATS debridement / decortication should be considered as a first-line treatment. This study revealed that VATS is a safe and effective treatment for postpneumonic empyema. The conversion rate to open procedure for patients who underwent VATS decortication was only

19%, which encourages us to consider VATS as a primary treatment option.

Chambers A, Routledge T, Dunning J, Scarci M (2010)[20] examined if videoassistedthoracoscopic surgical decortication (VATSD) is preferable to open decortication (OD) (or chest tube drainage) for the treatment of patients with primary empyema. The reported search yielded a total of 68 papers, of which 14 provided the strongest evidence to answer the clinical question. The authors, journal, date, and country of publication, patient population examined, study type, relevant outcomes, and findings are tabulated for these publications. In a study comparing VATSD and chest tube drainage for fibrinopurulent empyema, video-assisted Thoracoscopic surgery (VATS) was associated with greater treatment success (91% vs. 44%; P<0.05), shorter chest tube duration (5.8±1.1 vs. 9.8±1.3 days; P=0.03), and fewer total hospital days (8.7±0.9 vs. 12.8±1.1 days; P=0.009). In eight studies comparing early and late empyema, conversion rates to OD range from 0% to 3.5% in the early stage to 7.1% to 46% in the late stage, with significant reductions in length of stay with VATSD versus OD both postoperatively (5 vs. 8 days; P=0.001) and in total stay (15 vs. 21 days; P=0.03). In addition, VATS reduced postoperative discomfort (P<0.0001), as well as sequelae such as atelectasis (P=0.006), extended air leak (P=0.0003), sepsis (P=0.03), and 30-day mortality (P=0.02). Two studies directly compared VATSD to tube thoracostomy. Only five studies investigated chronic persistent empyema, and only two studies compared VATSD to tube thoracostomy (TT). VATS resolved 88% of cases and had a mortality rate of 1.3%, compared to 62% and 11% with TT. In addition, conversion to OD ranged from 10.5% to 17.1% with VATS and 18% to 37% with TT (P<0.05). In accordance with mixed stage empyema, hospital stay was reduced postoperatively (8.3 vs. 12.8 days; P0.05) and in total (14±1 vs. 17±1 days; P0.05), and when compared with OD (one study), pain (P<0.0001), postoperative air-leak (P=0.004), hospital stay (P=0.020), and time to return to work (P< 0.0001) were all

decreased with VATS. Moreover, re-operation (4.8% vs. 1%; P=0.09) and mortality (4/123% vs. 0%) were decreased in VATS compared to OD. The authors found that VATSD is superior than OD for the treatment of persistent pleural collections in terms of postoperative morbidity, comorbidities, and length of hospital stay, while providing equal resolution.

Tacconi F, Pompeo E, and Fabbi E (2010)[24] examined the feasibility, technical characteristics, and outcomes of conscious patients undergoing video-assisted pleural decortication for empyema thoracis. 19 patients (median age: 58 years) receiving awake video-assisted thoracoscopic pleural decortication under epidural anaesthesia (N = 15) or paravertebral blocks (N = 4) between March 2004 and September 2008 were included in this retrospective research. The degree of surgical lung re-expansion at 48 h, hospital stay, morbidity rate, and daily fluid loss were recorded as baseline and perioperative data. In addition, intraoperative and perioperative variations in the PaO2/FiO2 ratio, PaCO2, mean arterial pressure, and heart rate were analysed. Based on the findings, the aetiology of the empyema was parapneumonic (N = 14), post-traumatic (N = 3), and cancer-related (N = 2). All patients received prior conservative management. The median duration of symptoms was 35 days (quartile range: 28–40). Chronic obstructive pulmonary disease (COPD) (N = 4), HIV infection (N = 1), diabetes mellitus (N = 2), and cirrhosis (N = 1) were among the comorbidities. In 15 patients, the operation was conducted using video thoracoscopy, while four patients with significant pleural thickening had awake lateral thoracotomy. The average duration of an operation was 50 minutes (QR: 40–70). Analysis of intraoperative data revealed no intraoperative decline in arterial oxygenation (median-D: 0 mmHg, QR: 5/+9, P = 0.6). Three patients acquired transient permissive hypercapnia (55 mmHg) without requiring conversion to general anaesthesia. 1 h postoperatively, the median pain level as measured by a visual analogue scale (VAS) was 4 (QR: 2—5), and it decreased considerably on postoperative day 1 (median 3, QR: 2—4, P = 0.03).

There was no death or significant morbidity. The typical hospitalisation lasted 6 days (QR: 5—7). At postoperative chest X-ray, lung re-expansion was graded as complete in 16 patients, acceptable in two patients (>80%), and inadequate in an 86-year-old patient with pleural mesothelioma who has chest drain in situ 5 months after surgery. Empyema did not reoccur in any patient during subsequent follow-ups. The conclusion of the research was that awake video-assisted pleural decortication was possible and led to acceptable lung re-expansion in 95% of participants. We hypothesise that spontaneous ventilation facilitates identification of the right plane and dissection, resulting in reduced surgical damage to the lung underneath.

Tong BC, Hanna J, TolozaEM, Onaitis MW, D'Amico TA, Harpole DH, et al.[30] From 1996 to 2006, the results of 420 consecutive patients who had VATSD or OD for benign diseases were evaluated and compared in terms of baseline characteristics, preoperative care, and operational and postoperative course. Patients were assessed based on the intention to treat. The group included 326 VATSD patients and 94 OD patients. The VATSD to OD conversion rate was 11.4%. The operating duration and median period of hospitalisation were shorter for the VATSD group: 97 minutes against 155 minutes (p 0.001) and 15 days versus 21 days (p = 0.03), respectively. The median postoperative duration of stay for the VATSD group was seven days, whereas it was ten days for the OD group (p 0.001). In the areas of atelectasis, extended air leak, reintubation, ventilator reliance, tracheostomy, blood transfusion, infection, and 30-day mortality, the VATSD group had substantially fewer postoperative problems. Thoracoscopic decortication for empyema, complicated pleural effusion, and hemothorax is at least similar to open decortication, according to the findings of the research. Patients who undergo VATSD had less problems after surgery. The low conversion and reoperation rates indicate that a thoracoscopic approach is a successful and feasible first treatment choice for the majority of patients with complicated pleural effusions and empyema.

Schweigert M, Solymosi N, Dubecz A, FernándezMJ, Stadlhuber RJ, Ofner D, et al. (2016)[4] reported surgery for pleural empyema in a population with a high prevalence of multiple comorbidities and a high proportion of elderly patients to demonstrate not only the current outcomes of surgical management but also to identify strategies for future improvement. This retrospective analysis includes all patients who had surgery for parapneumonic pleural empyema between January 2006 and April 2013 at a leading centre for thoracic surgery in Germany. There were a total of 335 patients, with a mean age of 60.4 years. The mean ASA grade was 2.8. Empyema stages 1, 2, and 3 (American Thoracic Society categorization) were found in 30, 230, and 75 patients, respectively. The most prevalent comorbidities were cardiovascular diseases (124), diabetes, COPD, and alcoholism (54). The average score on the Charlson measure of comorbidity was 2. In 290 instances, minimally invasive surgery was achievable. The current investigation revealed that 88 individuals suffered from pulmonary sepsis. The overall mortality rate was 8.7%, or 29/335. The occurrence of pulmonary sepsis, respiratory failure , and acute renal failure, as well as Charlson score 3 was associated with higher mortality among patients aged 80 years or older. The conclusion of the research was ,Parapneumonic pleural empyema continues to be linked with substantial morbidity and death. Preexisting comorbidity, the presence of pulmonary sepsis, and sepsis-related sequelae have a decisive impact on the outcomes, although advanced age itself is not associated with an increased risk of a negative outcome. Before the development of pulmonary sepsis, early surgical intervention is capable of achieving further improvement.

SemenkovichTR, Olsen MA, Puri V, Meyers BF, and Kozower BD (2018)[7] investigated current treatment procedures and results for inpatient treatment of empyema using a large longitudinal dataset that includes a state's full cohort of hospitalised patients. The authors of the current investigation searched the Healthcare Cost and Utilization Project (HCUP) New York State Inpatient Database (2009-2014) for

patients with initial empyema and subsequent readmissions. Patients were divided into three groups according to the definitive treatment administered during their first hospitalisation: chest tube drainage, VATS decortication/drainage, and open decortication/drainage. Between groups, treatment outcomes such as success rates, readmission, reintervention, and death were compared. The cohort comprised 4,095 patients treated for primary empyema with a chest tube, VATS, or open drainage and decortication and discharged within the study period. The majority of patients had definitive operational care (chest tube: 38.2%, VATS: 32.0%, open: 29.8%, p=0.001), as shown by the outcomes (chest tube: 38.2%, VATS: 32.0%, open: 29.8%). Patients had a high mortality rate during their initial hospitalisation (chest tube: 15.4%, VATS: 4.7%, open: 6.0%, p=0.001) and a substantial 30-day readmission rate for empyema (chest tube: 7.3%, VATS: 3.8%, open: 4.1%, =p0.001), with reintervention at readmission being significantly higher for chest tube patients (6.1%) compared to surgical patients (VATS: 1.9%, open: 2.1%, p<0.001) This paper described the most current methods used to treat empyema patients. Higher rates of readmission and reintervention were reported among patients treated with chest tubes, indicating that some of these patients might benefit from early definitive surgical intervention.

Thori R, Desai GS, Pande P, Narkhede R, Vardhan A, Mehta H (2019)[23] assessed the role of the minimally invasive method for pleurectomy/decortication in all phases of ET. From January 2016 to December 2017, 33 patients with ET treated with VATS decortication were evaluated prospectively. All patients were observed for six months to assess surgical results, conversion rate, morbidities, and recurrence. Out of 33 patients, 5 had stage I, 18 had stage II, and 10 had stage III empyema, according to the results. The most prevalent signs were dyspnea (75.75%) and fever (63.63%). Bronchopulmonaryinfection (51.51%) and TB (33.33%) were the most prevalent causes. The conversion rate was 3.03 percent. The average operating time for stages I, II, and III was 102, 178.8, and 323 minutes,

respectively. The average length of hospitalisation for stages I, II, and III was 4, 5.11, and 9.3 days, respectively. Compared to stage II, intraoperative bleeding was much higher (625 ml) in stage III (327.7 ml). The average duration of a chest tube for stages I, II, and III was 13.4, 10.4, and 14.8 days, respectively. The conclusion of the research was that VATS decortication is a safe, practical, and successful therapy for all ET phases when performed on appropriately chosen patients at the right time by skilled surgeons. It improves outcomes in stage I ET by decreasing recurrence in situations when conservative therapy has failed. Even in stage III ET, optimum timing results in acceptable morbidity and postoperative recovery rates without high conversion rates.

Majeed FA, Zafar U, Chatha SS, Ali A, and Raza A (2020)[31] analysed the efficacy and morbidity of decortication in empyema thoracis. From January 2006 to March 2018, research was conducted in the Departments of Surgery at the Combined Military Hospitals (CMH) in Rawalpindi, Quetta, and Lahore. This was a retrospective analysis of 812 instances of open and VATS (video-assisted thoracic surgery) decortication for empyema thoracis, which were performed by the same physicians. Only patients with confirmed empyema were included in the study. Those who were ineligible for one-lung ventilation, having local anaesthetic treatments such as rib excision, clagget window or tube windows, had coagulated hemothorax and malignant pathology were excluded from the study. In open decortications, a posterolateralserratus-sparing thoracotomy was used. For video-assisted thoracoscopic decortications, multiportal or uniport VATS was used (VATD). In all instances, histopathology and microbiological tests were also performed. There were 537 men (66.1%) and 275 females (33.9%). The ages varied from 1 to 80 years, with a mean age of 37. Open decortication was performed on 650 patients (80%), standard decortication with posterolateral thoracotomy on 458 patients (56.4%), minithoracotomy on 69 patients (8.4%) with loculated empyema, and thoracotomy and open decortication with

conventional thoracoplasty on 21 patients. 22 patients needed open decortications, thoracoplasty, and muscle flap. 55 patients underwent open decortication with intercostal muscle (ICM) flap or primary closure of bronchopleural fistula. In 162 instances, VATD was performed, of which 120 were early empyema and 42 were chronic empyema; 22 of these cases needed an additional utility thoracotomy. In 25 patients, decortication with lung excision and muscle flap reinforcement to the bronchial stump was performed. In 331 (40.7%), a blood transfusion was necessary. 26 (3.4%) patients had residual space and collection necessitating intervention, while 384 (47.3%) patients had TB confirmed by histology. There were eleven fatalities (1.3%). The writers reached the conclusion that Open decortication remains one of the most popular practises in developing nations. VATD is also increasingly utilised for empyema.

MATERIAL AND METHODS

SOURCE OF DATA

This study was conducted in the department of surgery, Dayanand Medical College and Hospital, Ludhiana for a period of one and a half year i.e. 1st March 2021 to 31st August, 2022 including follow up of 1 month. Patients with empyema thoracis were enrolled in the study and the role of video assisted thoracoscopic surgery was assessed in them.

METHOD OF COLLECTION OF DATA

Information was collected through pre-designed proforma for each patient chosen to be a part of the study with detailed history, clinical examination.

INCLUSION CRITERIA

1.Patients diagnosed with empyema thoracis.
2. Patients who were fit for VATS decortication
3. Age more than 18 years.

EXCLUSION CRITERIA

The group of people having following contraindications to VATS and decortication were excluded.

1. Markedly unstable or patients in shock
2. Extensive adhesions obliterating pleural space
3. Prior talc pleurodesis
4. Inability to tolerate single lung ventilation
5. Bleeding disorders
6. Severe COPD
7. Respiratory failure
8. Corpulmonale/pulmonary hypertension

DURATION OF STUDY

The study was conducted for a period of one and a half year i.e. 1st March 2021 to 31st August, 2022 including follow up of 1 month.

METHOD OF COLLECTION OF DATA

The study was conducted in the Department of General Surgery, DMCH Ludhiana, for a time period of one and half year with a period of 1 month follow up after taking approval from the ethical committee. Patients undergoing VATD for empyema thoracis were evaluated and final outcome was noted in view of symptomatic improvement, cure, recurrence of symptoms, complications, conversion to open thoracotomy.

In this study we compared pre and post-operative PFT, ABG, Chest X Ray and Hugh-Jones dyspnea grading.[19]

Grade I – Patient's breathing is as good as that of other people of them own age and build during work, walking, and climbing hills or stairs.

Grade II – Patient is able to walk at pace with normal people of their own age and build on level ground, but is unable to keep up on hills or stairs.

Grade III- Patient is unable to keep up with normal people on level ground, but is able to walk about a mile or more at their own speed.

Grade IV – Patient is unable to walk more than about 50 yards on level

ground without a rest.

Grade V- Patient is breathless on talking or undressing, or unable to leave their house because of breathlessness; Unspecified. Patient is unable to be classified into the above grades because of bedridden status.

Other parameters like operative time, intraoperative blood loss, duration of air leak and chest drains, post-operative hospital stays,

atelectasis, intensive care unit stay, relapse/recurrence/readmission, case fatality and return to normal physical activity and work were also be considered, Written and informed consent will be taken from all patients going to be enrolled in this study.

Relevant present and past history was recorded. Findings of general physical examination and specific systemic examination was recorded in details along with investigations in the form of PFT, ABG, Chest X-Ray.

Clinical profile of patients included: Age (in years), gender (male/female), body mass index (BMI), cardiovascular comorbidities (Myocardial infarction, angioplasty, valvular heart disease, heart failure, pace makers), diabetes, previous thoracic interventions, ASA grading, symptoms (dyspnea, fever, cough, chest pain, hemoptysis), duration of symptoms (<3 weeks, > 3 weeks), etiology.

OUTCOME

Patient fulfilling the inclusion criteria were evaluated prospectively with period of one month follow up and final outcome will be noted in view of:-

1. Symptomatic improvement – improvement of dyspnea, improvement of hemodynamic function, pain relief
2. Cure- no pneumothorax, full expansion lung and no empyema thoracis on chest imaging, no symptoms.
3. Complications - persistent air leak, bleeding from pulmonary vessels, post-operative re-expansion pulmonary edema, respiratory insufficiency following VATS.

STATISTICAL ANALYSIS

Data was described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations was done using (Statistical Package for the Social Science) SPSS 26 version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

OBSERVATION AND RESULTS

TABLE 1: AGE DISTRIBIUTION OF PATIENTS UNDER STUDY

AGE	Number of cases	percentage
18-20	4	9.3%
21-30	8	18.6%
31-40	6	14.0%
41-50	14	32.6%
51-60	5	11.6%
61-70	6	14.0%
Total	43	100.0%

The maximum patients in the present study were present in age group 41-50 years (32.6%) followed by 21-30 years (18.6%), 31-40 years and 61-70 years (14.0%), 51-60 years (11.6%) and least were in <20 years (9.3%). The mean age of the patient was 37.60±16.3 years.

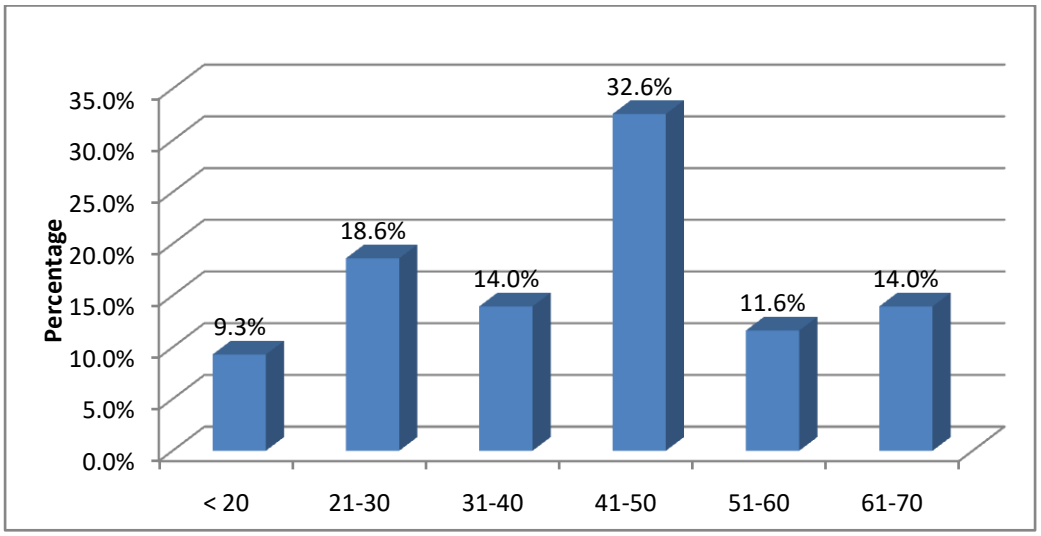

FIGURE 1: AGE DISTRIBUTION OF PATIENTS UNDER STUDY

TABLE 2: SEX DISTRIBUTION OF PATIENTS UNDER STUDY

Gender	No. of cases	Percentage
Female	7	16.3%
Male	36	83.7%
Total	43	100.0%

Male predominance was seen in the study. There were 83.7% males and 16.3% females in the study.

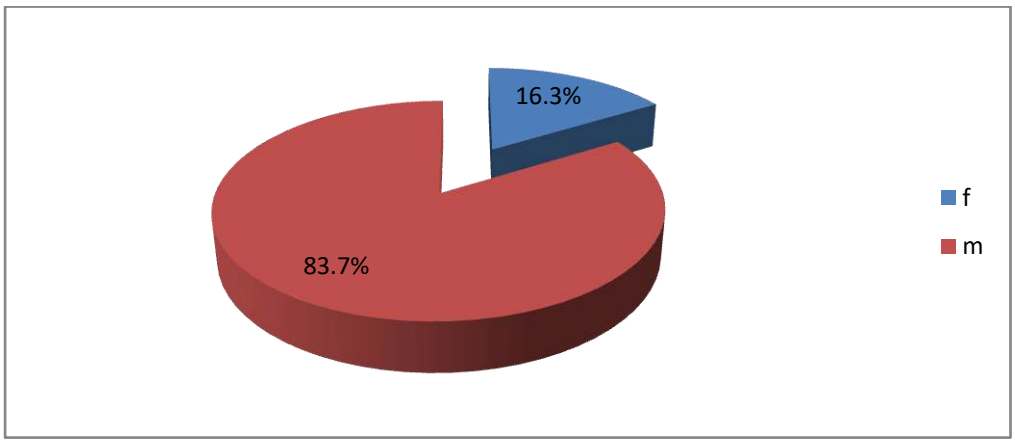

FIGURE 2: SEX DISTRIBUTION OF PATIENTS UNDER STUDY

TABLE 3: DISTRIBUTION OF PATIENTS ON THE BASIS OF CHIEF COMPLAINT

Chief complaint	No. of cases	Percentage
Breathlessness	36	83.7%
Chest pain	26	60.5%
Cough	5	11.6%
Fever	4	9.3%

In our study breathlessness was found to be main presenting symptom. 36 patients (83.7%) had breathlessness. 26 patients (60.5%) had chest pain. 5 patients (11.6%) had cough and 4 patients (9.3%) had fever.

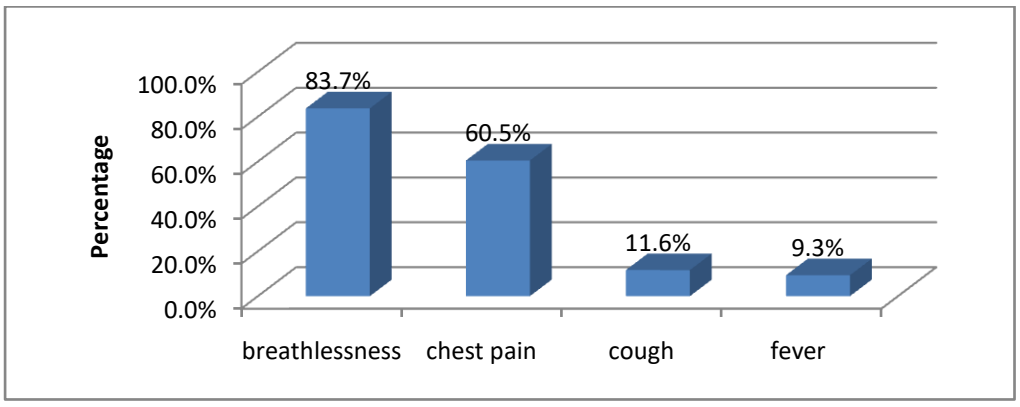

FIGURE 3: DISTRIBUTION OF PATIENTS ON THE BASIS OF CHIEF COMPLAINT

TABLE 4: DISTRIBUTION OF PATIENTS ACCORDING TO CO-MORBIDITIES

Co-morbidities	No. of cases	Percentage
HTN	4	9.3%
DIAB	5	11.6%
IHD	2	4.7%
TB	4	9.3%
B ASTHMA	0	0.0%
BLD DSRD	0	0.0%
ICD	9	20.9%
SMOKING	11	25.6%
COPD	1	2.3%

Out of 43 patients enrolled in the study, 4 patients (9.3%) were hypertensive (HTN), 5 patients (11.6%) had diabetes mellitus (DIAB), 2 patients (4.7%) had ischemic heart disease, 4 patients (9.3%) had tuberculosis (TB), 9 patients (20.9%) had ICD, 11 patients (25.6%) were having habit of smoking and 1 patient (2.3%) had COPD.

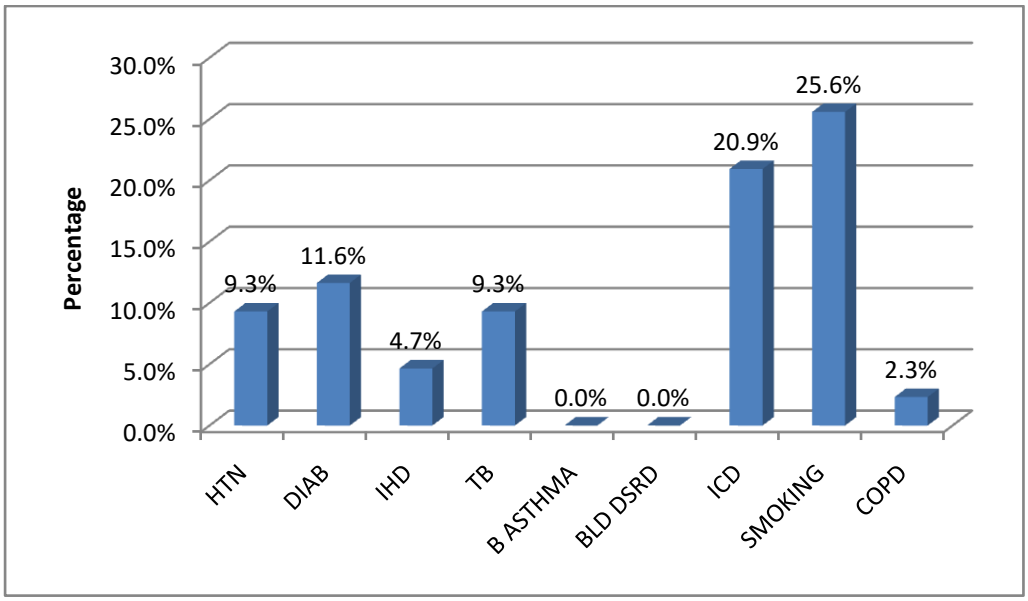

FIGURE 4: DISTRIBUTION OF PATIENTS ACCORDING TO CO-MORBIDITIES

TABLE 5: DISTRIBUTION OF PATIENTS ACCORDING TO FINDINGS IN CECT CHEST

CECT CHEST	No. of cases	Percentage
EMPYEMA THORACIS	20	46.5%
Hydro-pneumothorax with empyema	5	11.6%
Pneumothorax with empyema	14	32.6%
Tubercular empyema	4	9.3%
Total	43	100.0%

Out of 43 patients enrolled in the study, in CECT findings, 20 patients (46.5%) were diagnosed with empyema thoracis, 5 patients (11.6%) were diagnosed with hydropneumothorax with empyema, 14 patients (32.6%) were diagnosed with pneumothorax with empyema and 4 patients (9.3%) were diagnosed with tubular empyema.

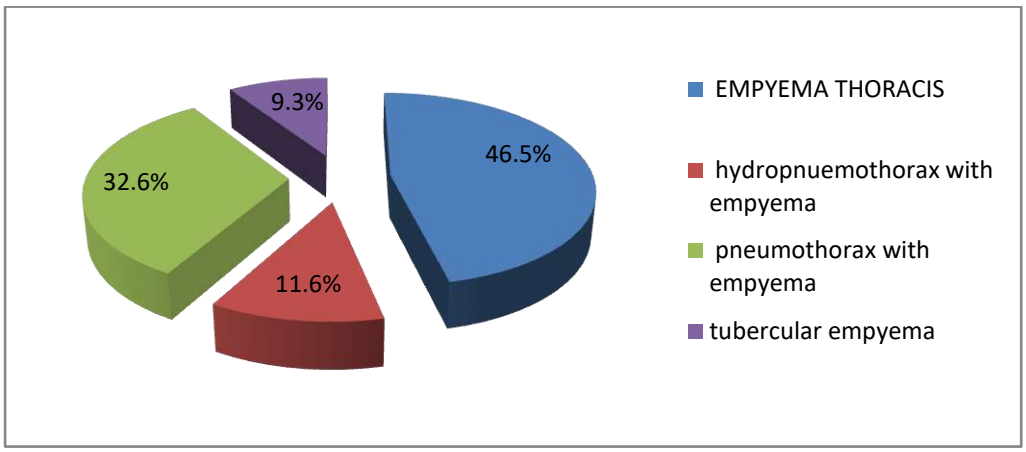

FIGURE 5: DISTRIBUTION OF PATIENTS ACCORDING TO FINDINGS IN CECT CHEST

TABLE 6: DISTRIBUTION OF PATIENTS ACCORDING TO CLINICAL DIAGNOSIS

CD	No. of cases	Percentage
EMPYEMA THORACIS	43	100.0%

In our study all the 43 patients (100.0%) were clinically diagnosed with empyema thoracis.

Table 7: DISTRIBUTION OF PATIENTS ACCORDING TO PROCEDURE DONE

PROCEDURE	No. of cases	Percentage
VATS DECORTICATION	43	100.0%

In our study the procedure VATS DECORTICATION was performed in all the 43 patients (100.0%)

TABLE 8: DISTRIBUTION OF PATIENTS ACCORDING TO INTRAOPERATIVE FINDINGS

INTRAOPERATIVE FINDINGS	No. of cases	Percentage
LEFT EMPYEMA THORACIS WITH THICKENED PLEURA	21	48.8%
LEFT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS	3	7.0%
RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA	12	27.9%
RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA	2	4.7%

WITH DENSE ADHESIONS		
RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH PURULENT COLLECTION	3	7.0%
THICK FIBROSED LAYER OVER VISCERAL PLEURA WITH PURULENT FLUID IN LEFT PLEURAL CAVITY	2	4.6%
Total	43	100.0%

In our study Intraoperative findings revealed that out of 43 patients, 21 patients (48.8%) had left empyema thoracis with thickened pleura, 3 patients (7.0%) had left empyema thoracis with thickened pleura with dense adhesions, 12 patients (27.9%) had right empyema thoracis with thickened pleura, 2 patients (4.7%) had right empyema thoracis with thickened pleura with dense adhesions, 3 patients (7.0%) had right empyema thoracis with thickened pleura with purulent collection, 2 patient (4.6%) had thick fibrosed layer over visceral pleura with purulent fluid in left pleural cavity.

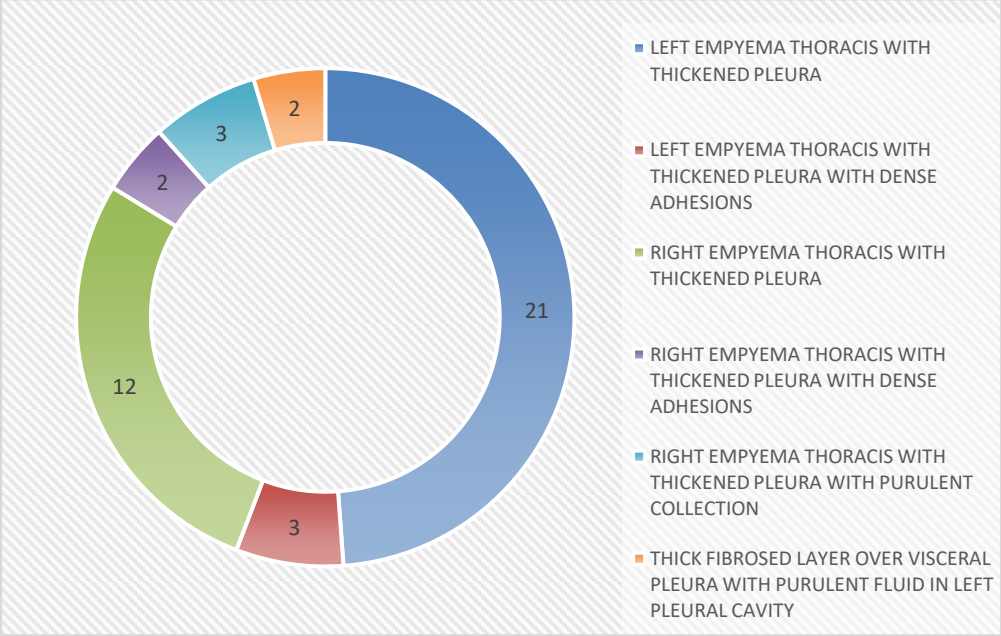
21
3
12
2
3
2
LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
LEFT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH PURULENT COLLECTION
THICK FIBROSED LAYER OVER VISCERAL PLEURA WITH PURULENT FLUID IN LEFT PLEURAL CAVITY

FIGURE 6: DISTRIBUTION OF PATIENTS ACCORDING TO INTRAOPERATIVE FINDINGS

TABLE 9: CONVERSION OF VATS PROCEDURE TO OPEN THORACOTOMY

Conversion	No. of cases	Percentage
No	40	93%
Yes	3	7%
Total	43	100.0%

In 3(7%) patients out of 43 patients enrolled VATS procedure was converted to open thoracotomy

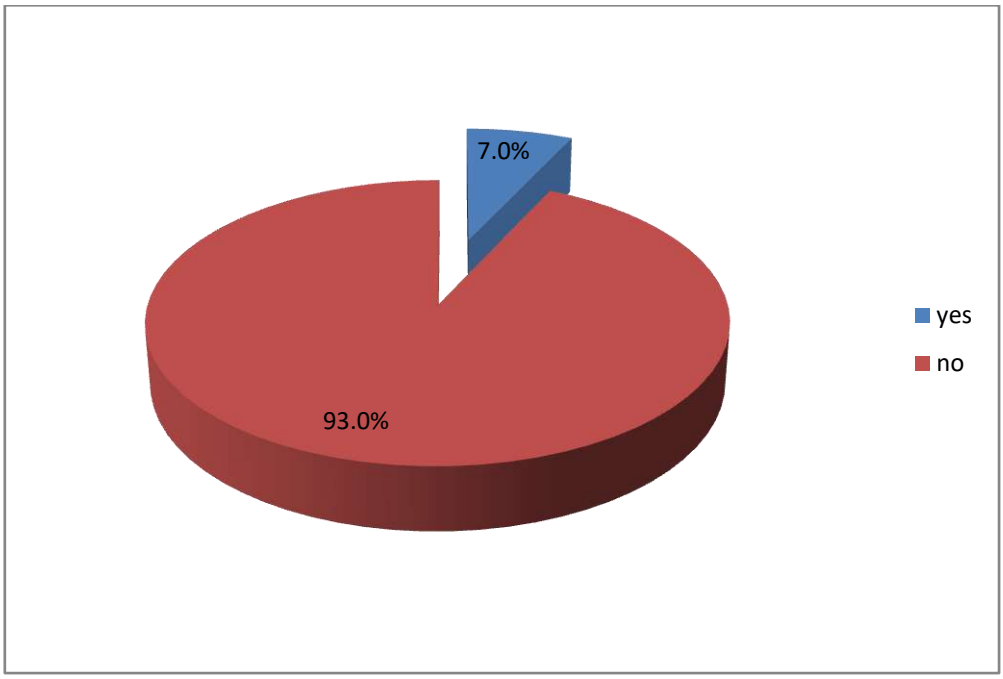

FIGURE 7: CONVERSION OF VATS PROCEDURE TO OPEN THORACOTOMY

TABLE 10: REASON FOR CONVERSION OF VATS PROCEDURE TO OPEN THORACOTOMY

Reason	No. of cases	Percentage
No	40	93.02%
Dense Adhesions	1	2.33%
Thick peel	2	4.65%
Total	43	100.0%

In 40 patients (93.02%), no conversion was done. In 1 patient (2.33%) VATS procedure was converted to open thoracotomy due to dense adhesions and in other 2 patients (4.65%) it was converted due to presence of thick peel.

TABLE 11: DISTRIBUTION OF PATIENTS ACCORDING TO PRE-OPERATIVE CHEST XRAY FINDINGS

CXR pre op	No. of cases	Percentage
HYDROPNEUMOTHORAX	5	11.6%
HYDROPNEUMOTHORAX WITH ICD	2	4.7%
PLEURAL EFFUSION WITH ICD	1	2.3%
PLEURAL EFFUSION WITH PNEUMOTHORAX	1	2.3%
PNEUMOTHORAX	9	20.9%
HYDROPNEUMOTHORAX	1	2.3%
PLEURAL EFFUSION	17	39.5%
PLEURAL EFFUSION WITH ICD	1	2.3%
PLEURAL EFFUSION WITH PNEUMOTHORAX	1	2.3%
PNEUMOTHORAX WITH ICD	5	11.6%
Total	43	100.0%

Out of total 43 patients in pre-operative chest x-ray findings, 5 patients (11.6%) were diagnosed with hydropneumothorax, 2 patients (4.7%) were diagnosed with hydropneumothorax with ICD, 1 patient (2.3%) was having pleural effusion with ICD, 1 patient (2.3%) was having pleural effusion with pneumothorax, 9 patients (20.9%) were having pneumothorax, 1 patient (2.3%) was having hydropneumothorax, 17 patients (39.5%) were having pleural effusion, 1 patient (2.3%) was having pleural effusion with ICD, 1 patient (2.3%) was having pleural effusion with pneumothorax and other 5 patients (11.6%) were diagnosed with pneumothorax with ICD.

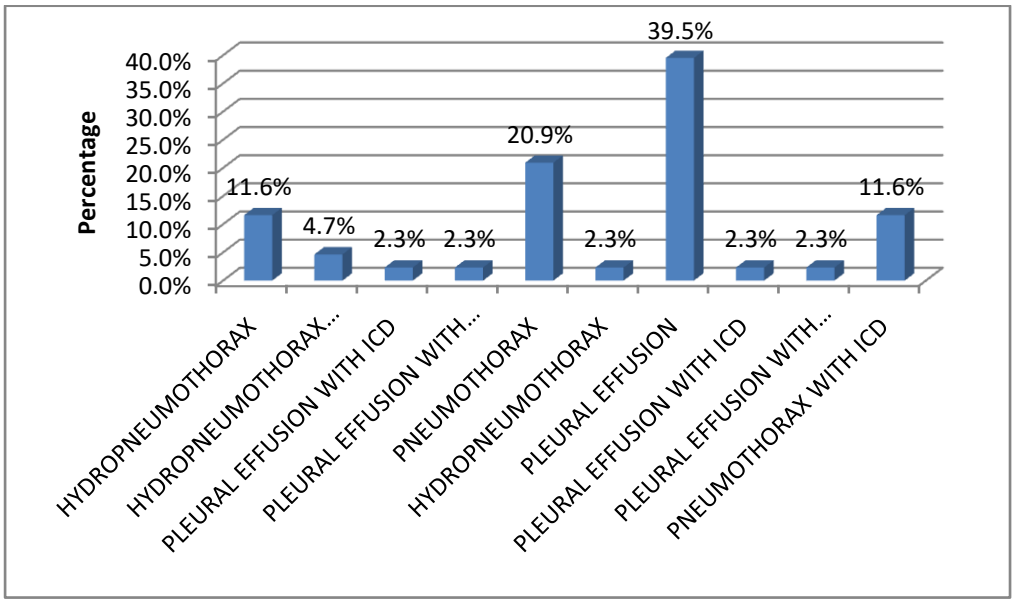

FIGURE 8: DISTRIBUTION OF PATIENTS ACCORDING TO PRE-OPERATIVE CHEST XRAY FINDINGS

TABLE 12: DISTRIBUTION OF PATIENTS ACCORDING TO POST-OPERATIVE CHEST XRAY FINDINGS

CXR post op	No. of cases	Percentage
EXPANDED LUNG	38	88.40%
PARTIAL EXPANDED LUNG	5	11.60%
Total	43	100.0%

In post-operative chest x-ray findings, 38 patients (88.40%) were diagnosed with Expanded lung. While in 5 (11.60%) the lungs were partially expanded.

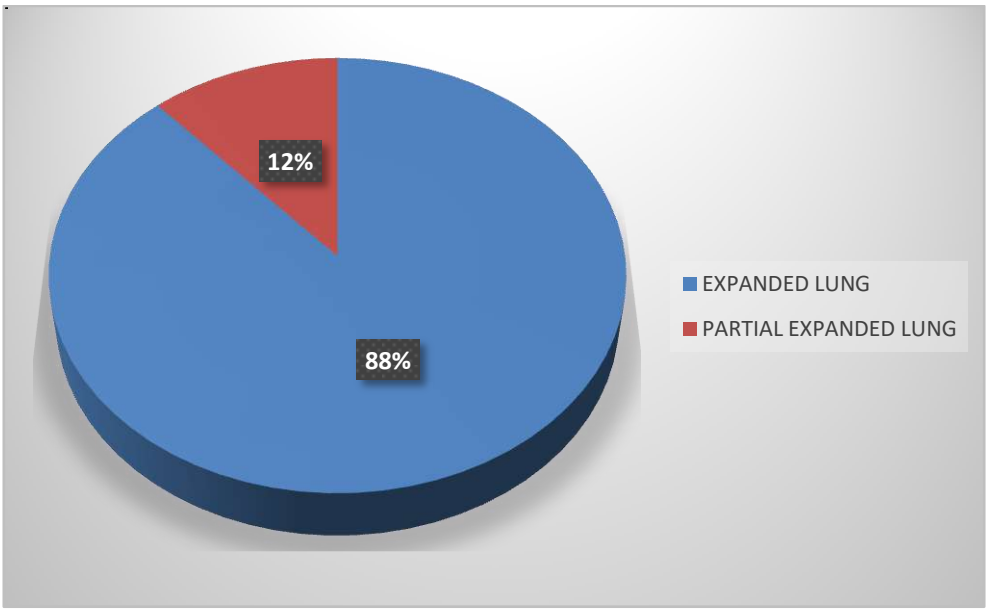

FIGURE 9: DISTRIBUTION OF PATIENTS ACCORDING TO POST-OPERATIVE CHEST XRAY FINDINGS

TABLE 13: DISTRIBUTION OF PATIENTS ACCORDING TO PRE-OPERATIVE DYSPNEA INDEX

Dyspnea Index pre op	No. of cases	Percentage
2	6	14.0%
4	26	60.5%
5	11	25.6%
Total	43	100.0%

Out of total 43 patients, 6 patients (14.0%) were having pre-operative dyspnea index was 2, 26 patients (60.5%) were having pre-operative dyspnea index was 4 and other 11 patients (25.6%) were having pre-operative dyspnea index was 5.

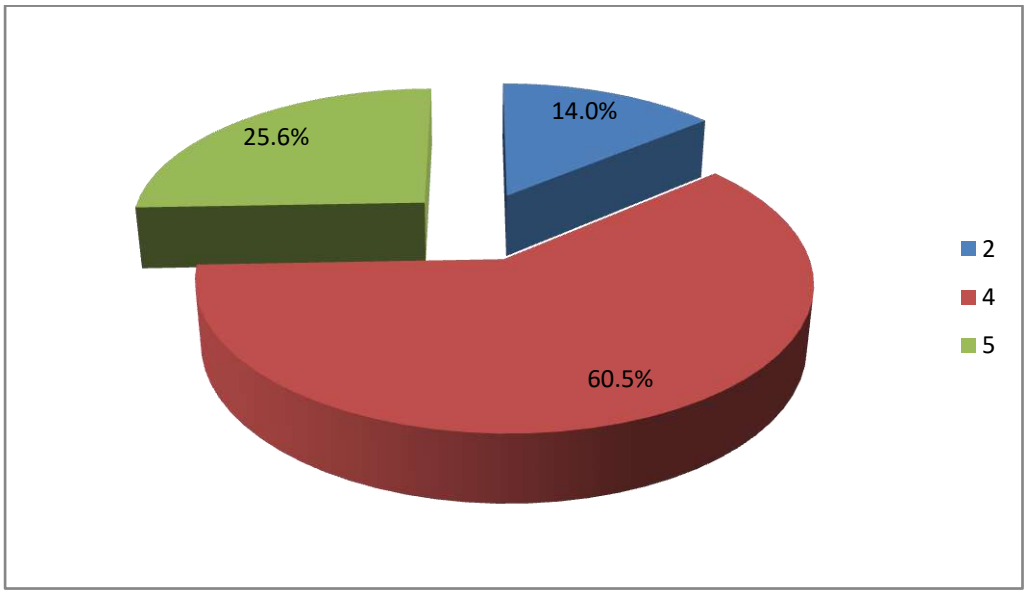

FIGURE 10: DISTRIBUTION OF PATIENTS ACCORDING TO PRE-OPERATIVE DYSPNEA INDEX

TABLE 14: DISTRIBUTION OF PATIENTS ACCORDING TO POST-OPERATIVE DYSPNEA INDEX

Dyspnea Index post op	No. of cases	Percentage
1	41	95.3%
2	2	4.7%
Total	43	100.0%

Out of total 43 patients, 41 patients (95.3%) were having post-operative dyspnea index was 1 and other 2 patients were having post-operative dyspnea index was 2

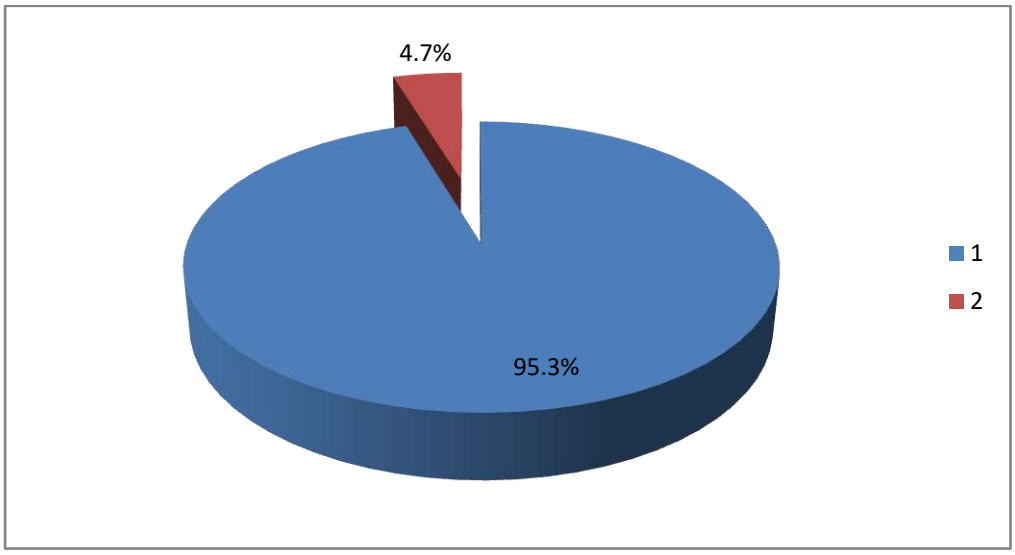

FIGURE 11: DISTRIBUTION OF PATIENTS ACCORDING TO POST-OPERATIVE DYSPNEA INDEX

TABLE 15: DISTRIBUTION OF PATIENTS ACCORDING TO TIME TO RETURN TO WORK (DAYS)

Time to Return to Work	No. of cases	Percentage
7	11	25.6%
8	13	30.2%
9	1	2.3%
10	7	16.3%
11	1	2.3%
12	4	9.3%
13	1	2.3%
14	1	2.3%
15	4	9.3%
Total	43	78.2%

In our study out of 43 patients, the working time in 11 patients (25.6%) was 7 days, in 13 patients (30.2%) the working time was 8 days, in 1 patient (2.3%) the working time was 9 days, in 7patients (16.3%) the working time was 10 days, in 1 patient (2.3%) the working time was 11 days, in 4 patients (9.3%) the working time was 12 days, in 1 patient (2.3%) the working time was 13 days, in 1patient (2.3%) the working time was 14 days, in other 4 patients (9.3%) the working time was 15 days.

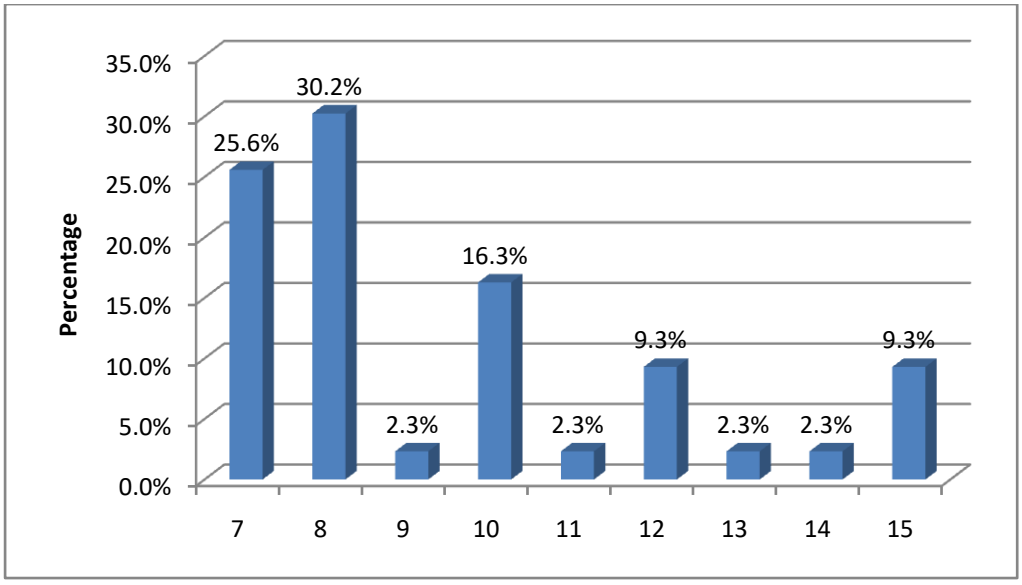

FIGURE 12: DISTRIBUTION OF PATIENTS ACCORDING TO TIME TO RETURN TO WORK (DAYS)

TABLE 16: DISTRIBUTION OF PATIENTS ACCORDING TO BIOPSY REPORT

Biopsy Report	No. of cases	Percentage
Empyema	23	53.5%
Lung abscess	12	27.9%
Pneumonitis with empyema	7	16.3%
Tuberculosis with empyema	1	2.3%
Total	43	100.0%

In our study biopsy report revealed that, out of total 43 patients, 23 patients (53.5%) patients were diagnosed with empyema, 12 patients (27.9%) were diagnosed with lung abscess, 7 patients (16.3%) were diagnosed with Pneumonitis with empyema and other 1 patient (2.3%) was diagnosed with Tuberculosis with empyema.

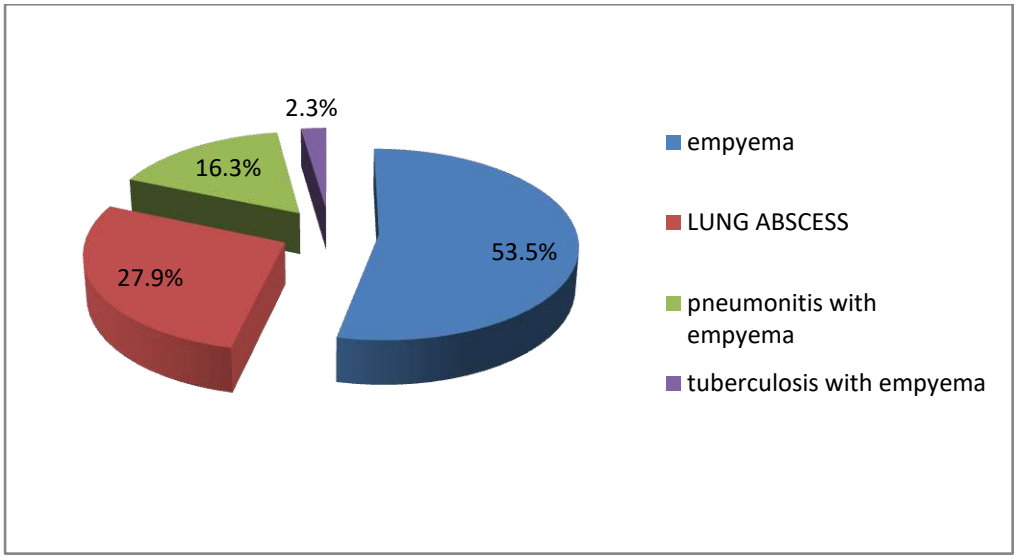

FIGURE 13: DISTRIBUTION OF PATIENTS ACCORDING TO BIOPSY REPORT

TABLE 17: DISTRIBUTION OF PATIENTS ACCORDING PROLONGED AIR LEAK

Prolonged Air Leak	No. of cases	Percentage
No	40	93
Yes	3	7
Total	43	100.0%

Prolonged air leak i.e. air leak more than 7 days was observed in 3 patient (7%) out of total 43 patients enrolled.

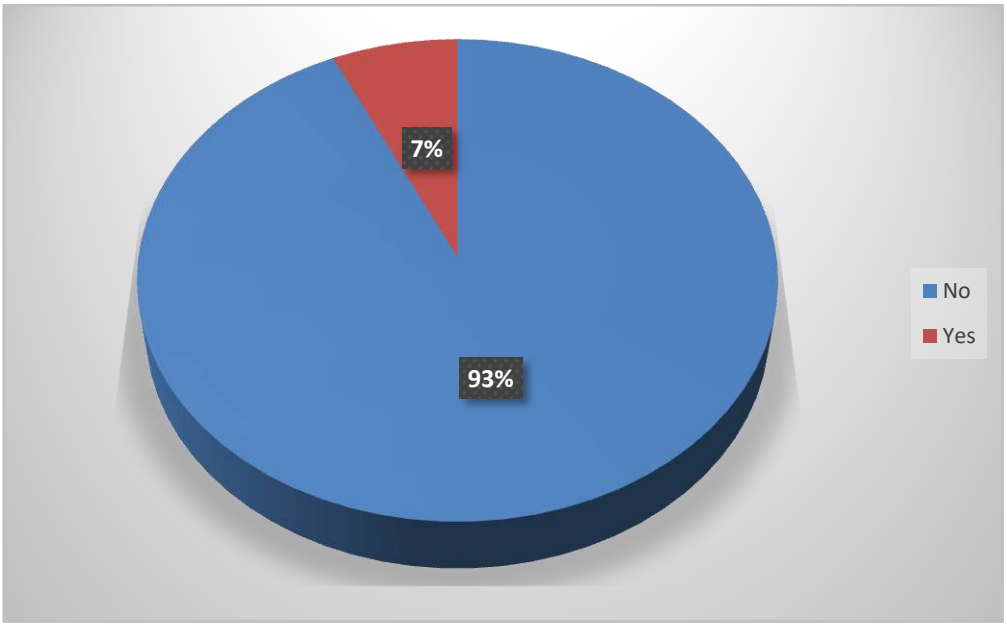

FIGURE 14: DISTRIBUTION OF PATIENTS ACCORDING PROLONGED AIR LEAK

TABLE 18: DISTRIBUTION OF PATIENTS ACCORDING TO WOUND COMPLICATION

Wound Complications	No. of cases	Percentage
NO	43	100.0%

None of patient in our study out of total 43 patients enrolled was diagnosed with wound complication.

TABLE 19: MEAN MINIMUM AND MAXIMUM AGE, WEIGHT AND HEIGHT OF THE PATIENTS UNDER STUDY

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	43	19.00	70.00	41.16	15.38
WEIGHT	43	58.00	91.00	77.05	7.41
HEIGHT	43	155.00	183.00	175.02	7.48

In our study minimum age was 19 years and maximum age was 70 years with mean of 41.16

years ± 15.38 std. deviation. The minimum weight was 58 kg and maximum weight was 91 kg with mean of 77.05 kg ±7.41std. deviation. Minimum height was 155.00 cm and maximum height was 183.00 cm with mean of 175.02 cm ± 7.48 std. deviation.

TABLE 20: MEAN MINIMUM AND MAXIMUM OF PRE-OPERATIVE AND POST-OPERATIVE PULMONARY FUNCTION TESTS, PaO2 AND PaCO2

	N	Minimum	Maximum	Mean	Std. Deviation
Pre OP FEV1 PREDICTED	17	2.52	5.81	4.50	0.80
Pre OP FEV1 %PREDICTED	17	55.00	81.00	64.24	9.52
Pre OP FVC PREDICTED	17	2.94	6.40	5.22	0.84
Pre OP FVC % PREDICTED	17	60.00	84.00	71.12	7.70
Pre OP fev1/fvc	17	65.36	94.59	78.31	7.89
Pre OP PaO2	43	55.00	86.00	65.95	7.96
Pre OP PaCO2	43	36.00	49.00	42.07	4.03
Post OP FEV1 PREDICTED	17	2.52	5.81	4.50	0.80
Post OP FEV1 %PREDICTED	17	56.00	93.00	75.82	11.32
Post OP FVC PREDICTED	17	2.94	6.40	5.22	0.84
% PREDICTED Post OP	17	60.00	91.00	79.47	6.73
fev1/fvc Post OP	17	73.33	108.79	87.90	9.27
PaO2 Post OP	43	46.00	88.00	68.86	9.00
PaCO2 Post OP	43	34.00	47.00	40.12	3.70

Above table shows descriptive pre-operative and post-operative pulmonary function tests and data pertaining to lung volumes.

TABLE 21: MEAN MINIMUM AND MAXIMUM DURATION OF HOSPITAL STAY

	N	Minimum	Maximum	Mean	Std. Deviation
HOSPITAL STAY	43	3.00	12.00	4.77	1.74

In our study of 43 patients who underwent VATS procedure, mean duration of hospital stay was of 4.77 days ± 1.74 std. deviation with minimum duration of 3.00 days and maximum duration of 12.00 days.

TABLE 22: MEAN MINIMUM AND MAXIMUM DURATION OF SYMPTOMS

	N	Minimum	Maximum	Mean	Std. Deviation
Duration	43	1.00	60.00	7.47	10.39

Of total 43 patients enrolled in the study, the mean duration of symptoms were 7.47days ± 10.39 std. deviation with minimum duration was 1 day and maximum duration was 60 days.

TABLE 23: MEAN MINIMUM AND MAXIMUM BLOOD LOSS

	N	Minimum	Maximum	Mean	Std. Deviation
BLD LOSS(ML)	43	30.00	200.00	61.05	40.72

In our study total 43 patients underwent VATS procedure. Mean blood loss in VATS procedure was 61.05 ± 40.72 ml with minimum being 30 ml and maximum being 200 ml.

TABLE 24: MEAN MINIMUM AND MAXIMUM DURATION OF Surgery

	N	Minimum	Maximum	Mean	Std. Deviation
DURATION(MIN)	43	45.00	200.00	75.35	30.95

Of total 43 patients, mean duration of surgery was 75.35 min ± 30.95 std. deviation with minimum duration of 45 min and maximum duration of 200 min.

TABLE 25: MEAN MINIMUM AND MAXIMUM PRE-OPERATIVE AND POST-OPERATIVE DYSPNEA INDEX

	N	Minimum	Maximum	Mean	Std. Deviation
DYSPNEA INDEX pre op	43	2.00	5.00	3.98	0.91
Dyspnea index post op	43	1.00	2.00	1.05	0.21

Of total 43 patients, the mean pre-operative dyspnea index was 3.98 ± 0.91 std. deviation with minimum pre-operative dyspnea index was 2 and maximum was 5. The mean post- operative dyspnea index was 1.05 ± 0.21 std. deviation with minimum post-operative dyspnea index was 1 and maximum was 2.

TABLE 26: MEAN MIMIMUM AND MAXIMUM POST OPERATIVE PAIN

	N	Minimum	Maximum	Mean	Std. Deviation
POST OPERATIVE PAIN day 1	43	6.00	8.00	6.44	0.63
POD 3	43	1.00	5.00	2.72	0.98
POD 7	43	0.00	3.00	0.53	0.77
I MONTH	43	0.00	0.00	0.00	0.00
3 MONTHS	43	0.00	0.00	0.00	0.00

Of 43 patients enrolled in the study, the mean of post-operative pain at day 1 was 6.44 ± 0.63 std. deviation with minimum post-operative pain at day 1 was 6 and maximum was 8. The mean of post-operative pain at day 3 was 2.72 ± 0.98 std. deviation with minimum post- operative pain at day 3 was 1 and maximum was 5. The mean of post-operative pain at day 7 was 0.53 ± 0.77 std. deviation with minimum post-operative pain at day 7 was nil and maximum pain was 3. No pain was observed after 1 month and 3 months post-operatively.

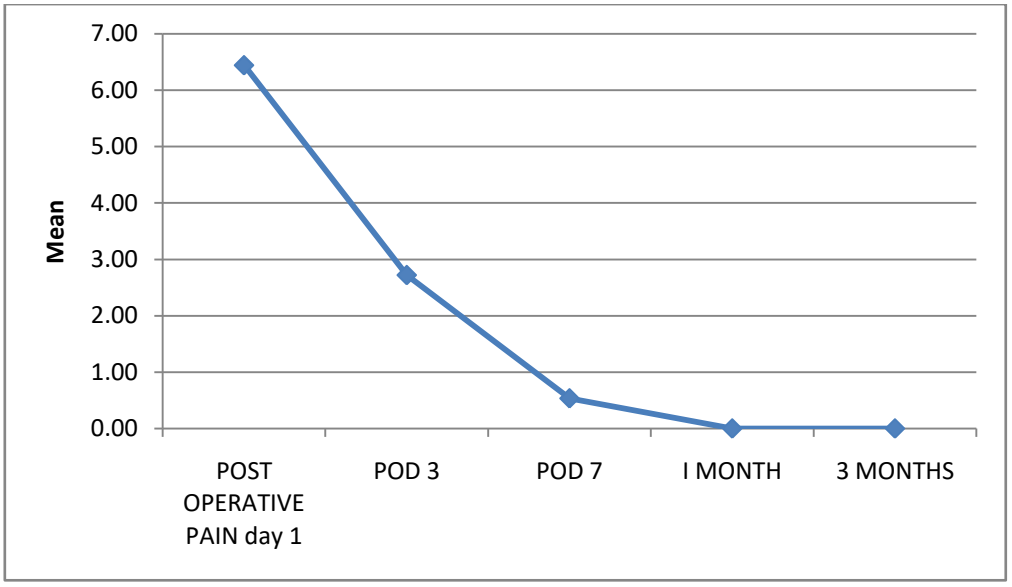

FIGURE 15: MEAN MIMIMUM AND MAXIMUM POST OPERATIVE PAIN

TABLE 27: MEAN MINIMUM AND MAXIMUMTIME TO WORK

	N	Minimum	Maximum	Mean	Std. Deviation
TIME TO WORK	43	7.00	15.00	9.44	2.58

Mean number of days for return to work after VATS procedure was 9.44 days ± 2.58 std. deviation with minimum of 7 days and maximum of 15 days.

TABLE 28: MEAN MINIMUM AND MAXIMUM DURATION OF NEGATIVE SUCTION

	N	Minimum	Maximum	Mean	Std. Deviation
POST OP Negative suction (days)	5	2.0	5.0	3.8	1.6

Post op negative suction was applied in 5 patients for mean duration of 3.8 days with minimum of 2 days and maximum of 5 days. It was applied for partial lung expansion on post-op chest x ray.

TABLE 29: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN FEV1% PREDICTED

	Pre op		Post op		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
FEV1 %PREDICTED	64.24	9.52	75.82	11.32	-10.583	0.001	-11.59	4.51

FEV1% increased from pre-operative mean 64.24%±9.52 std deviation to post-operative mean 75.82 %±11.32 std deviation of percentage predicted which is significant with p value of 0.001.

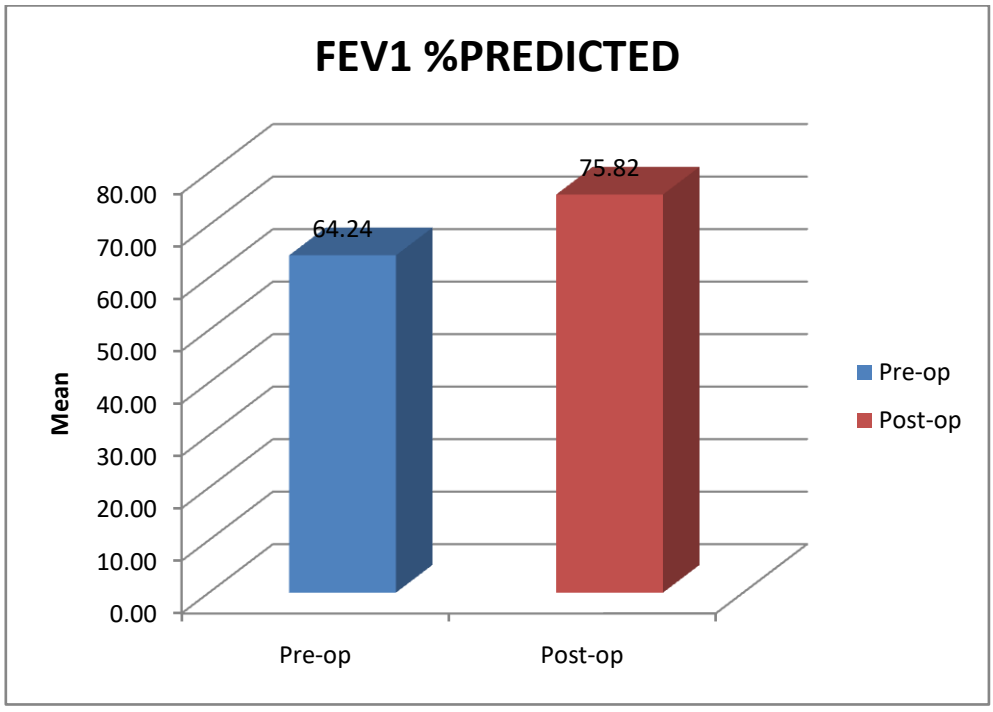

FIGURE 16: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN FEV1% PREDICTED

TABLE 30: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN OF FVC% PREDICTED

	Pre-op		Post-op		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
FVC% PREDICTED	71.12	7.70	79.47	6.73	-4.902	0.001	-8.35	7.03

FVC% increased from pre-operative mean 71.12%±7.70 std deviation to post-operative mean 79.47% ± 6.73 std deviation of percentage predicted which is significant with the p value 0.001.

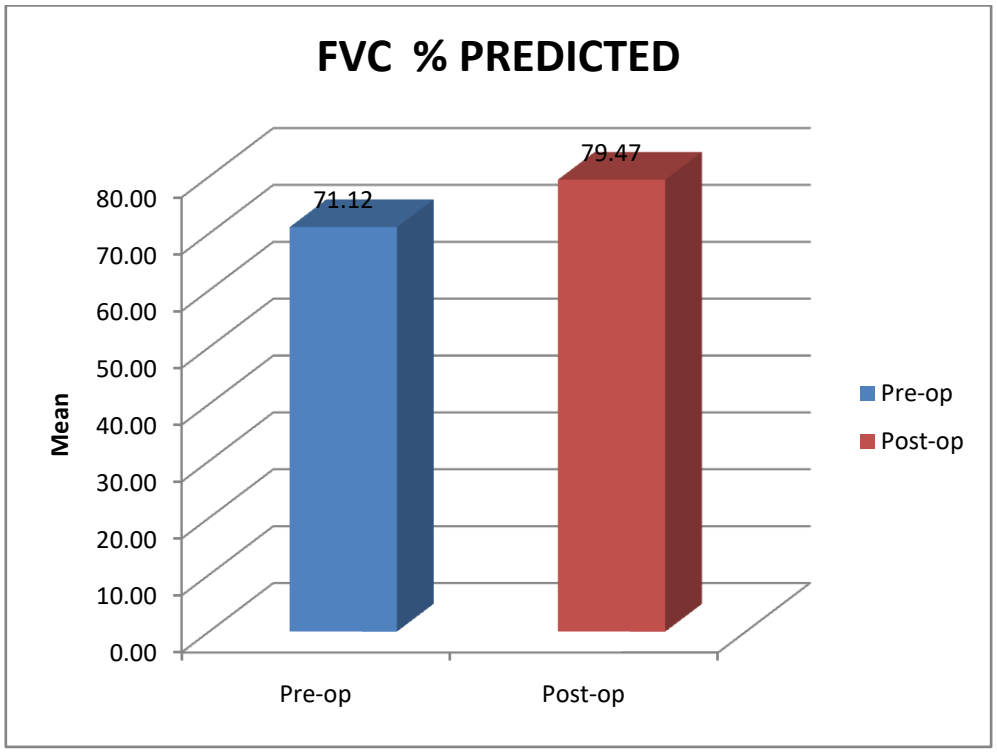

FIGURE 17: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN OF FVC% PREDICTED

TABLE 31: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN FEV1/FVC RATIO

	Pre op		Post op		T	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
Fev1/Fvc	78.31	7.89	87.90	9.27	-5.522	0.001	-9.59	7.16

Mean FEV1/FVC ratio increased from mean 78.31±7.89 std deviation to mean 87.90±9.27 std deviation which is significant with the p value 0.001 in our study of 43 patients.

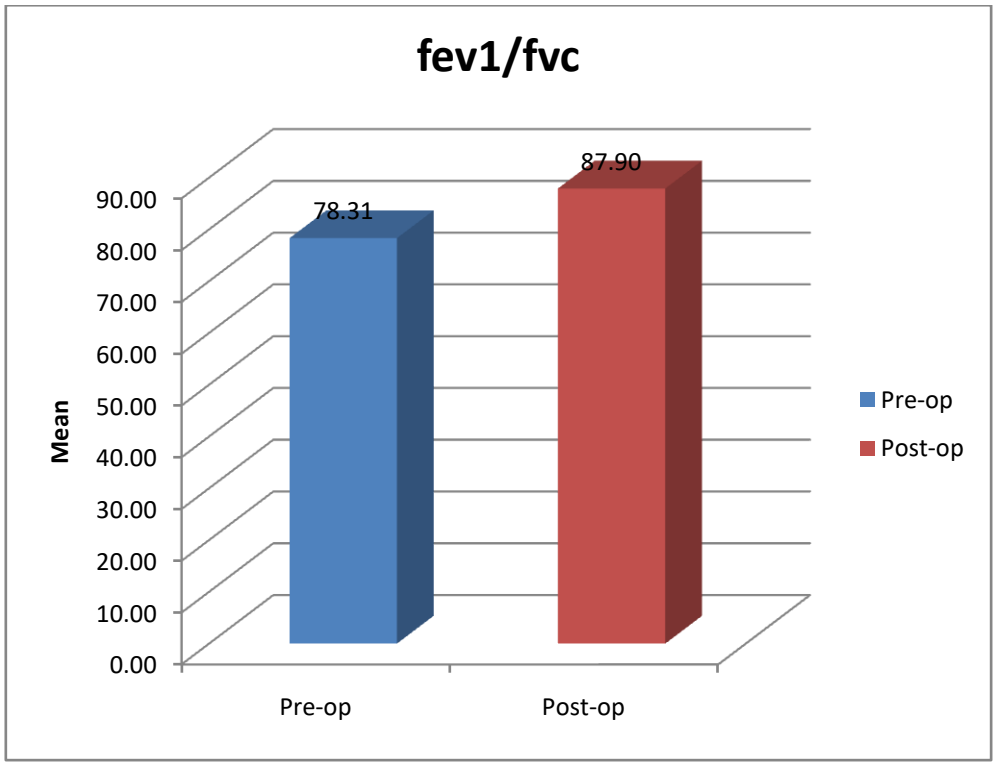

FIGURE 18: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN FEV1/FVC RATIO

TABLE 32: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN OF PaO2

	Pre		Post		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
PaO2	65.95	7.96	68.86	9.00	-3.411	0.001	-2.91	5.59

In our study of 43 patients who underwent VATS procedure were evaluated for pre-op and post-op PaO2. PaO2 increased from mean of 65.95 mm of Hg±7.96 std deviation to mean 68.86 mm of Hg±9.00 std deviation which is significant with the p value 0.001.

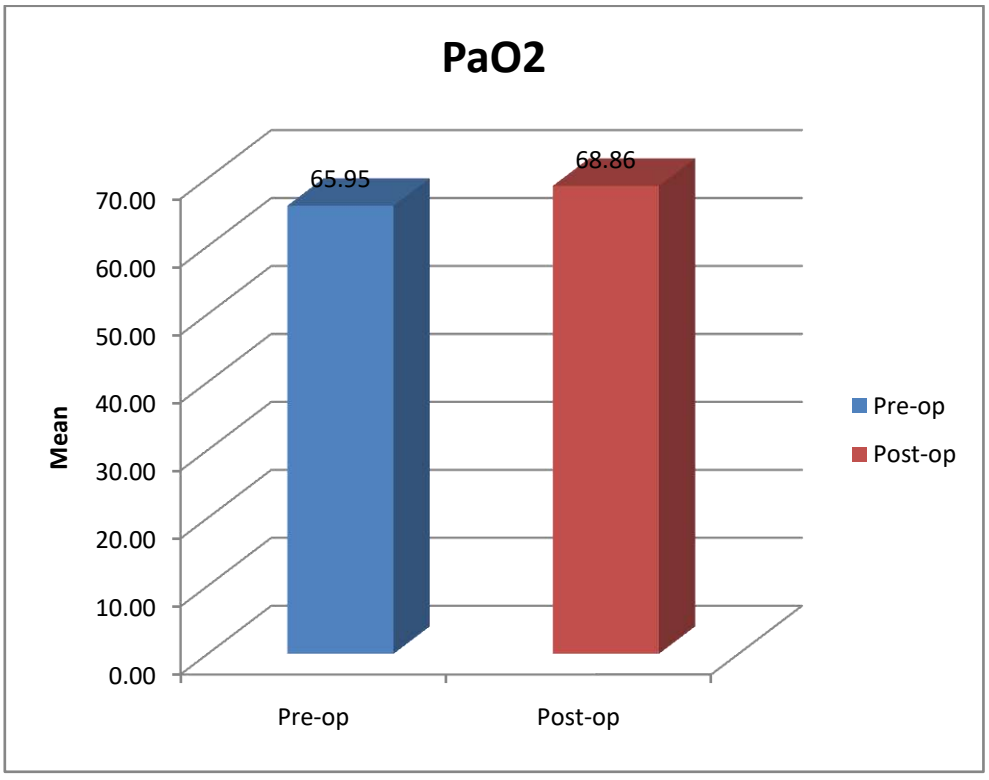

FIGURE 19: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN OF PaO2

TABLE 33: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN OF PaCO2

	Pre		Post		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
PaCO2	42.07	4.03	40.12	3.70	6.920	0.001	1.95	1.85

In our study of 43 patients who underwent VATS procedure were evaluated for pre-op and post-op PaCO2. PaCO2 decreased from mean of 42.07 mm of Hg±4.03 std deviation to mean 40.12 mm of Hg±3.70 std deviation which is significant with the p value of 0.001.

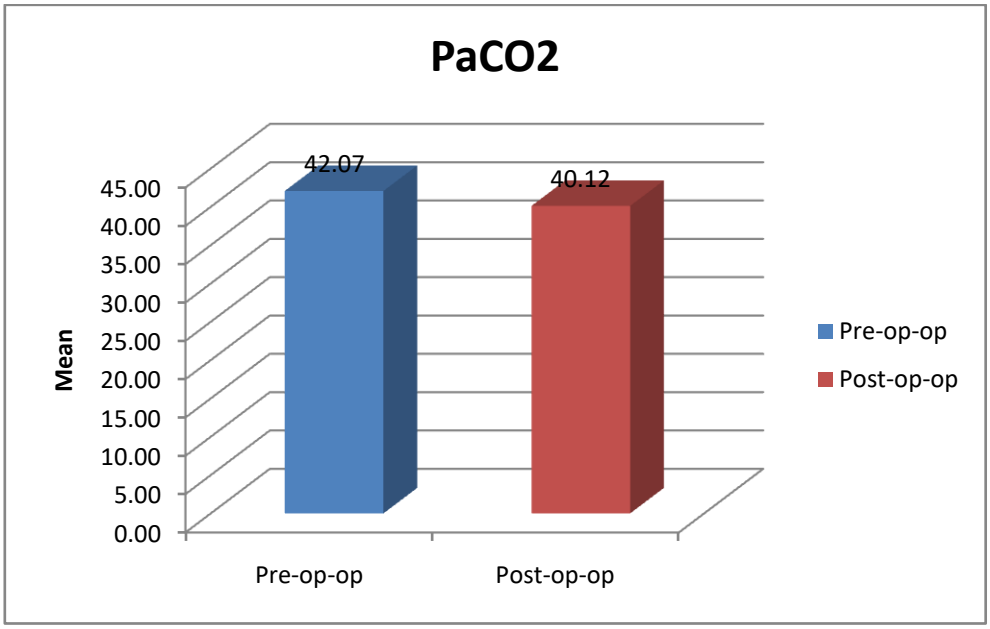

FIGURE 20: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE MEAN OF PaCO2

TABLE 34: COMPARISON OF DYSPNEA INDEX IN PATIENTS BEFORE AND AFTER SURGERY

	Pre-op		Post-op		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
DYSPNEA INDEX	3.98	0.91	1.05	0.21	20.530	0.001	2.93	0.94

Mean dyspnea index decrease from mean 3.98±0.91 std deviation in the pre-operative to the mean of 1.05±0.21std deviation at Post-operative which is significant with the p value of 0.001.

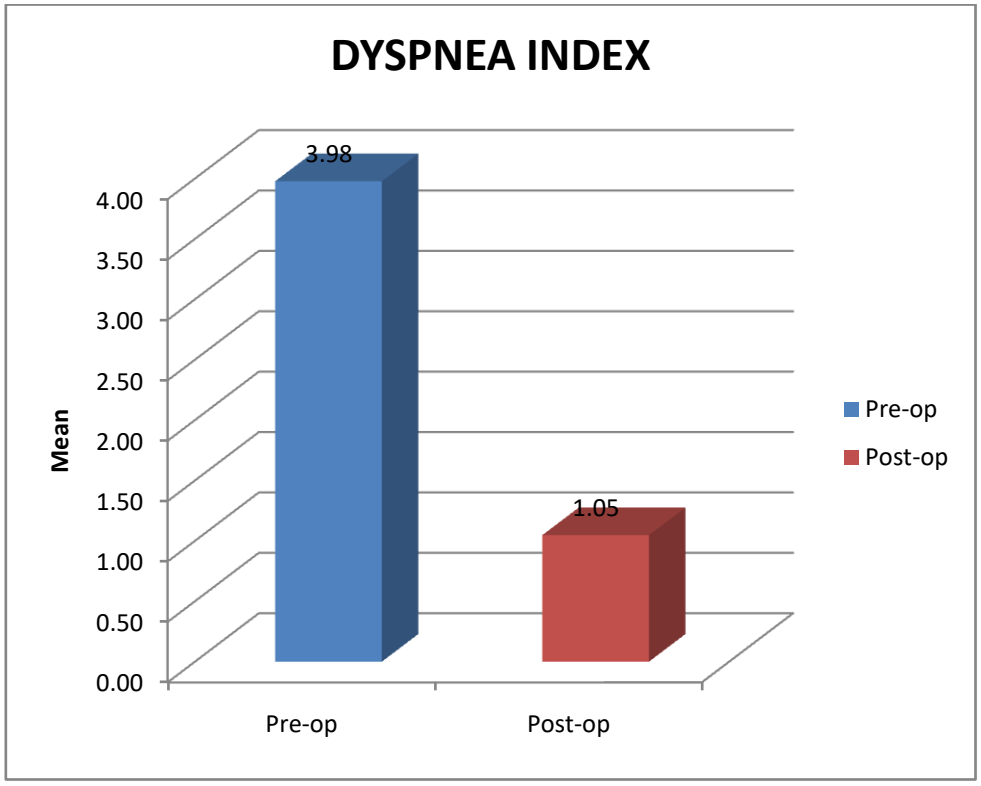

FIGURE 21: COMPARISON OF DYSPNEA INDEX IN PATIENTS BEFORE AND AFTER SURGERY

TABLE 35: COMPARISON OF MEAN OF PRE-OPERATIVE AND POST-OPERATIVE PAIN

	Pre-op		Post-op		t	p-value	Difference	
	Mean	SD	Mean	SD			Mean	SD
POD 3	6.44	0.63	2.72	0.98	31.84	0.001	3.72	0.77
POD 7	6.44	0.63	0.53	0.77	63.50	0.001	5.91	0.61
I MONTH	6.44	0.63	0.00	0.00	67.18	0.001	6.44	0.63
3 MONTHS	6.44	0.63	0.00	0.00	67.18	0.001	6.44	0.63

Mean of pain on day 3 was decrease from mean 6.44±0.63 std deviation in the pre-operative to the mean of 2.72±0.98 std deviation at Post-operative which is significant with the p value of 0.001. Mean of pain on day 7 was decrease from mean 6.44±0.63 std deviation in the pre- operative to the mean of 0.53±0.77 std deviation at post- operative which is significant with the p value of 0.001 and mean of pain on 1 month and 3 month was decrease from mean 6.44±0.63 std deviation to nil with significant p value of 0.001.

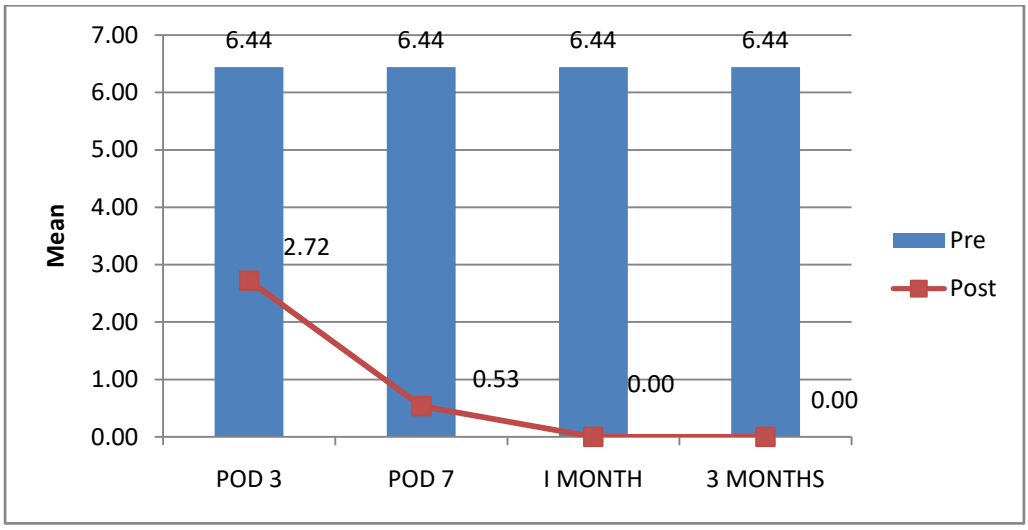

FIGURE 22: COMPARISON OF MEAN OF PRE-OPERATIVE AND POST-OPERATIVE PAIN

DISCUSSION

Empyema thoracis is a worldwide problem affecting all age groups. A major problem in the management of thoracic empyema is formation of fibrinous adhesions in the visceral and parietal pleura, which can lead to entrapment of lung, renders it difficult to drain the pleural space and failing in re-expansion of lung by antibiotics and thoracocentesis alone. The present study was conducted in the department of surgery, Dayanand Medical College and Hospital, Ludhiana for a period of one and a half year on patients with empyema thoracis. The present study was conducted to determine the clinical profile and outcome of VATS decortication done for empyema thoracis.

The maximum patients in the present study were present in age group 41-50 years (32.6%) followed by 21-30 years (18.6%), 31-40 years and 61-70 years (14.0%), 51-60 years (11.6%) and least were in <20 years (9.3%). The mean age of the patient was 37.60±16.3 years. In a study by Acharya and shah[32] conducted in 2007 on 40 patients with Empyema thoracis the mean age was reported to be 33.12 years. The mean age in the 77 patients with empyema thoracis in a study by Daniel et al[29] was 46.1 ± 14.7 years. Thus, the mean age in present study was in age range as mentioned in the previous studies.

Male predominance was seen in the study. There were 83.7% males and 16.3% females in the study and male : female ratio in present study was 5.14:1. Thori et al[23] conducted a study in 2019 on 43 patients of thoracic empyema and reported that 69.69 % patients were males while 30.3% were females. In a study by Dass et al[33] total 150 patients with Thoracic empyema were analyzed and found the male to female ratio to be 1.42:1. Acharya and shah[32] in their study reported that males outnumbered female patients in the ratio of 3.4:1.0. Males in general are more prone to mechanical stresses and strenuous work. Smoking is a more frequent habit, and tuberculosis and COPD are more frequent in males. All these factors contribute to increased incidence of empyema thoracis in males.

In our study breathlessness was found to be main presenting symptom. 36 patients (83.7%) had breathlessness. 26 patients (60.5%) had chest pain. 5 patients (11.6%) had cough and 4 patients (9.3%) had fever. In a study conducted by Kamat[34] cough (94%) was the most common symptom followed by fever (76%), chest pain (75%) and dyspnea (53%). Another study by acharaya and shah[32] reported breathlessness and cough in 37 patients (92.5%); followed by fever (35, 87.5%) and chest pain (32, 80%). In addition, constitutional symptoms, viz., anorexia, malaise and weight loss, were noted in 25in their study patients (62.5%).

The clinical manifestations of an empyema can vary widely, depending on both the nature of the infecting organism and the competence of the patient's immune system. The spectrum ranges from an almost complete absence of symptoms to a severe illness with systemic toxicity. In general, anaerobic and tubercular empyemas usually present with a subacute illness, whereas aerobic bacterial infections of the pleural space present with an acute illness.[35]

In current study out of 43 patients enrolled in the study, 4 patients (9.3%) were hypertensive (HTN), 5 patients (11.6%) had diabetes mellitus (DIAB), 2 patients (4.7%) had ischemic heart disease, 4 patients (9.3%) had tuberculosis (TB), 9 patients (20.9%) had ICD, 11 patients (25.6%) were having habit of smoking and 1 patient (2.3%) had COPD. Cargil et al[36] conducted a systemic review to investigate worldwide patterns of pre-existing comorbidities and clinical outcomes of patients with pleural infection. They analyzed 134 articles and found that the percentage prevalence of pre-existing comorbidity was high (median 72%) with a wide range of chronic conditions affecting the major organ systems. This is consistent with large population-based studies, which have reported comorbidity prevalence of up to 74% and supports the hypothesis that the rise in the incidence of pleural infection in recent years might be associated with an increasingly ageing and multi-morbid population.[37] Chronic respiratory and

cardiovascular conditions had the highest percentage prevalence and where specific conditions were reported, hypertension, diabetes mellitus, stroke and ischaemic heart disease all had median prevalence rates between 11% and 23%. As the majority of studies were from high-income settings where these conditions are endemic, this finding may seem unsurprising, and indeed, known risk factors for these diseases including smoking and alcohol excess were also reported (median 42% and 15%, respectively).[38-39]

CECT chest findings confirmed empyema thoracis in 20 patients(46.5%), hydropneumothorax with empyema in 5 patients (11.6%), pneumothorax with empyema in 14 patients(32.5%) and tubular empyema in 4 patients(9.3%).

In present study in 4(9.3%) patients VATS procedure was converted to open thoracotomy. In present study in 40 patients (93.0%), no conversion was done. In 1 patient (2.3%) VATS procedure was converted to open thoracotomy due to dense adhesion and in other 3 patients (7.0%) it was converted due to presence of thick peel.

In a meta-analysis by Pan H et al., conversion rate of VATS decortication ranged from 0%–11.3% with an average rate of 8.7%.[40] In a study by conducted by Solaini et al.,[41] in 120 patients with pleural empyema (all stages underwent VATS) with 8.2% conversion to OD. In their study in most cases, the reason for conversion was thick peel and dense adhesions (late fibrinopurulent and chronic stages) that could not be adequately debrided by VATS. In some patients, poor visualization as a result of bloody field during dissection was the reason for conversion. Those who underwent successful decortications by VATS had less dense adhesions and were in the early phase of empyema, i.e., exudative and early fibrinopurulent stages.

In current study out of 43 patients in pre-operative chest x-ray findings, 5 patients (11.6%) were diagnosed with hydropneumothorax, 2 patients (4.7%) were diagnosed with hydropneumothorax with ICD, 1 patient (2.3%) was having pleural effusion with ICD, 1 patient (2.3%)

was having pleural effusion with pneumothorax, 9 patients (20.9%) were having pneumothorax, 1 patient (2.3%) was having hydropneumothorax, 17 patients (39.5%) were having pleural effusion, 1 patient (2.3%) was having pleural effusion with ICD, 1 patient (2.3%) was having pleural effusion with pneumothorax and other 5 patients (11.6%) were diagnosed with pneumothorax with ICD.

In a study by acharya and shah[32] radiologically, 8 patients (20%) had a 'meniscus sign,' suggesting effusion, whereas 30 patients had an air-fluid level suggestive of hydropneumothorax. Two patients (5.0%) presented with radiological features of encystement.

In post-operative chest x-ray findings, 38 patients (88.40%) were diagnosed with Expanded Lung. While in 5 (11.60%) the lungs were partially expanded.

In a study by Acharya and shah[32] out of 40 patients, 25 (62.5%) had complete expansion of the lung, while 12 patients (30%) had only partial expansion. Patients with partial expansion mainly comprised of those who presented late in the course of the disease, i.e., chronic empyema with thickened pleura, and those who developed a chronic BPF after ICDT.

For Thoracic empyema the standard chest X-ray is usually the first radiographic study obtained. Despite advances in imaging modalities, plain radiographs still serve as a great screening tool for pleural effusions in patients with pneumonia. Typically, a unilateral, markedly asymmetric pleural effusion with blunting of the costophrenic angle can be appreciated. Smaller volume effusions are detectable with a lateral view X-ray. Decubitus views can be obtained to assess for layering and help quantify an existing effusion.

Mean dyspnea index decrease from mean 3.98±0.91 std deviation in the pre-operative to the mean of 1.05±0.21std deviation at Post-operative which is significant with the p value of 0.001.

A study by Casali et al[42] also showed that Videothoracoscopic approach is associated to a better dyspnea degree in comparison with the traditional open approach (*P*=0.041).

FEV1% predicted increased from pre-operative mean 64.24 %±9.52 std deviation to post-operative mean 75.82% ± 11.32 std deviation of percentage predicted which is significant with the p value 0.001. Mean FEV1/FVC ratio increased from mean 78.31±7.89 std deviation to mean 87.90±9.27 Std deviation which is significant with the p value 0.001 in our study of 43 patients.

In a study conducted by Abraham et al[43] decortication was performed in lung empyema cases they reported FEV_1 was 70.51% before surgery vs. 83.43% after surgery (p<0.001). FVC was 69.74% before surgery vs. 85.40% after surgery (p<0.001).

Numerous studies[43-45] have documented the impact of decortication on pulmonary function. Most patients have had significant increases in FVC and FEV_1 in all of these studies. Choi et al.[44] compared the preoperative and postoperative spirometry parameters after classifying the patients into two groups based on the bacteriologic etiology. All the spirometry parameters improved significantly in both groups. However, no significance was shown in the rate of increase of parameters between the two groups.

Decortication retains the functional capacity of the lung to a great extent. However, the extent to which the lung function can be restored has been a subject of controversy in the scientific community. There are studies that show contradictory findings that attribute to the differences in numbers and quality of the analyzed material. Patients with tuberculousetiology are prone to worse surgical outcome in terms of morbidity and mortality. When tuberculosis is the etiology, spirometry parameters will not show any improvement after decortication.[46] Based on their studies, Petro et al.[47] and Toomes et al.[48], concluded that the measured spirometry parameters did not improve after treatment. Their studies also pointed out that patients with a

preoperative vital capacity decrease of more than 40% of their predicted value experience functional benefits. However in current study in subjects with a tuberculousetiology, contradicts these findings by showing a significant improvement in the measured spirometry parameters.

In present study mean number of days for return to work after VATS procedure was 9.44 days ± 2.58 std. deviation with minimum of 7 days and maximum of 15 days. In a study by Cardillo et al[49] the time to return to work in case of patients who underwent decortication via VATS was significantly less than open thoracotomy. This was in accordance to the present study. Of total 43 patients, mean duration of surgery was 75.35 min ± 30.95 std. deviation with minimum duration of 45 min and maximum duration of 200 min.Mean duration of hospital stay was of 4.77 days ± 1.74 std. deviation with minimum duration of 3.00 days and maximum duration of 12.00 days.

In a study by Bailey et al[50] median operative times of 86 min were obtained for VATS, with median total length of stay (LOS) of 15 days, respectively; median preoperative LOS was longer for thoracotomy (10 days) compared with VATS (5 days) while median postoperative LOS was longer for VATS (14 days) in comparison with thoracotomy (9.5 days). The LOS reported BY Chen et al[51] was 7.2 days.

Kim et al in their study reported the Mean operating time to be 79.5 ± 15 minutes and postoperative hospital stay 5.7 ± 6 days. This was in accordance to the present study.[52]

Cardillo et al[49] compared the clinical outcomes of open thoracotomy decortication and decortication by VATS and demonstrated the latter to be better in terms of inpatient hospital stay, pain, postoperative air leak, operative time, and time to return to work.

Casali et al[42] demonstrated that decortication by VATS had shorter postoperative hospital stay and chest drainage duration than thoracotomy; in addition, decortication by VATS showed higher

improvement in subjective dyspnea degree. The results presented herein are consistent with this report, with respect to postoperative hospital stay. Interestingly, it was reported that despite wide use of decortication by VATS in drainage easing, significant practical benefits such as rib crowding and pleural symphysis could not be obtained in this setting.[21]

Luh et al[9] in 2005 there was also significant reductions in postoperative length of stay (effusion 9.1 vs. 18.5 days; *P*-0.05), Post-operative hospital stay in a study by Majeed et al[53] was <5 days in 75% cases, while a study reported average number of postoperative hospital stays in case of patients who underwent thoracoscopy to be 7.8 days, and in another study it was 12.3 days.[54-55]

In our study mean blood loss in VATS procedure was 61.05 ± 40.72 ml with minimum being 30 ml and maximum being 200 ml. in a study by Mazeed et al[53] Blood transfusion was required in 40.7% patients. In a study conducted by Jindal et al[56] the intraoperative blood loss was also significantly increased in the OT group (407.41 ± 243.26 ml) when compared to the VATS group (195.83 ± 182.92 ml).

Prolonged air leak i.e. air leak more than 7 days was observed in 3 patient (7%) out of total 43 Patients however none of the patients in present study presented with wound complications. Chen et al[51] observed prolonged air leak was recorded in 6 patients (2.3%), who were cured by prolonged drainage and enhanced nutrition. All other postoperative complications were improved by symptomatic treatment. In a study by Hazzar et al[57] Air-leak was detected in 3 patients (4.76%); air space was noticed in 1 patient (1.58%); wound infection in 2 patients (3.17%); and acute respiratory distress syndrome (ARDS) occurred in two cases (3.17%). There were no complications noticed for Stage II VATS except one case of atelectasis. Most complications were found in Stage III for both type of surgeries (VATSD or open thoracotomy).

Mean of pain score (VAS) preoperatively was 6.44±0.63 which postoperatively decreased to 2.72±0.98 on day 3 , 0.53±0.77 on day 7 while at 1 and 3 months it was nil (p value = 0.001). Jindal et al[56] in their study showed, the mean post-operative pain as measured by VAS score on POD 1 was 5.21 ± 1.14 for VATS and 7.67 ± 0.48 for the open group, which was a statistically significant difference. The difference in pain was found to be significant until 1 month of the post-operative period. At 3 months of post-operative follow-up, only 1 patient belonging to the OT group had pain that required analgesics. This can be a result of the intercostal neuralgia that occurs due to injury to the intercostal nerves when access is gained to the thoracic cavity by spreading the ribs and dissecting the pleura. For adequate analgesia, NSAIDs and opioids were given.

Consistent with our findings, the mean VAS scores on POD 1 and POD 30 in a study by Kumar *et al*.[58]on 102 patients undergoing VATS lobectomy were 5.09 and 0.02, respectively. In a study by Andreetti*et al*.,[59] lower pain scores were found in patients who underwent VATS lobectomy. The differences between the mean post-operative pain values were significant at 1, 12, 24 and 48 h (6.24 vs. 8.74, 5.16 vs. 7.66, 4.19 vs. 6.89, 2.23 vs. 5.33; *P* = 0.000). Similarly, Demmy and Nwogu[60] in their study also validated the superior efficacy of VATS in terms of post-operative pain and quality of life when compared to OT.

VATS offer lot of advantages to the patients. Patients have a shorter period of general anaesthesia because of the time saved in avoiding opening and closure of the thoracotomy. Postoperative stay is shorter owing to reduced requirement for invasive pain control (thoracic epidural) and earlier mobilization. The durability of the technique has been shown by the excellent clinical and radiologic results obtained postoperatively and most patients did not require follow-up in excess of 6 months. The development of visceral decortication adds a further stage to the technique of pleural debridement already described, thereby extending the role of VATS in the treatment of chronic

postpneumonic pleural empyema. Its success is subject to a learning curve, however, which must be appreciated. The early involvement of a thoracic surgeon in the management of patients with postpneumonic pleural empyema is advocated.

SUMMARY AND CONCLUSION

The Present study was conducted in the department of surgery, Dayanand Medical College and Hospital, Ludhiana for a period of one and a half year i.e. 1st March 2021 to 31st August, 2022 including follow up of 1 month. Patients with empyema thoracis were enrolled in the study and the role of video assisted thoracoscopic surgery was assessed in them. The results of the present study are summarised below:

- The mean age of the patient was 37.60±16.3 years with male to female ratio being 5.14:1.
- Majority of the study population had breathlessness followed by chest pain.
- CECT chest findings confirmed empyema thoracis in 20 patients(46.5%), hydropneumothorax with empyema in 5 patients (11.6%), pneumothorax with empyema in 14 patients(32.5%) and tubular empyema in 4 patients(9.3%).
- VATS was performed in all cases and we observed that 3 (7%) patients VATS procedure was converted to open thoracotomy reason being dense adhesion in 1 case and in other 2 patients. It was converted due to presence of thick peel.
- In pre-operative chest x-ray findings, 5 patients (11.6%) were diagnosed with hydropneumothorax, 2 patients (4.7%) were diagnosed with hydropneumothorax with ICD, 1 patient (2.3%) was having pleural effusion with ICD, 1 patient (2.3%) was having pleural effusion with pneumothorax, 9 patients (20.9%) were having pneumothorax, 1 patient (2.3%) was having hydropneumothorax, 17 patients (39.5%) were having pleural effusion, 1 patient (2.3%) was having pleural effusion with ICD, 1 patient (2.3%) was having pleural effusion with pneumothorax and other 5 patients (11.6%) were diagnosed with pneumothorax with ICD.

- In our study mean blood loss in VATS procedure was 61.05 ± 40.72 ml with minimum being 30 ml and maximum being 200 ml.
- Prolonged air leak i.e. air leak more than 7 days was observed in 3 patient (7%) out of total 43 Patients however none of the patients in present study presented with wound complications.
- Mean of pain score (VAS) preoperatively was 6.44±0.63 which postoperatively decreased to 2.72±0.98 on day 3 , 0.53±0.77 on day 7 while at 1 and 3 months it was nil (p value = 0.001).
- Mean dyspnea index decrease from mean 3.98±0.91 in the pre-operative to + 1.05±0.21 Post-operatively (p value = 0.001).
- FEV1% predicted increased from pre-operatively from 64.24 %±9.52 to 75.82%±11.32 postoperatively (p= 0.001). Mean FEV1/FVC ratio increased from 78.31±7.89 to 87.90±9.27 postoperatively.
- In current study patients who underwent VATS procedure, mean duration of hospital stay was of 4.77 days ± 1.74 std.
- In present study mean number of days for return to work after VATS procedure was 9.44 days ± 2.58 with minimum of 7 days and maximum of 15 days.

CONCLUSION

- VATS offer lot of advantages to the patients. Patients have a shorter period of general anaesthesia because of the time saved in avoiding opening and closure of the thoracotomy. Postoperative stay is shorter than after open surgery owing to reduced requirement for invasive pain control (thoracic epidural) and earlier mobilization. The durability of the technique has been shown by the excellent clinical and radiologic results obtained postoperatively and most patients did not require follow-up in excess of 6 months. The development of visceral decortication adds a further stage to the technique of pleural debridement already described, thereby extending the role of VATS in the treatment of chronic postpneumonic pleural

empyema. Its success is subject to a learning curve, however, which must be appreciated. The early involvement of a thoracic surgeon in the management of patients with postpneumonic pleural empyema is advocated.

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PROFORMA

Sr. No

MRD. NO.

NAME

AGE

SEX

ADM NO

DATE OF ADMISSION

DATE OF SURGERY

DATE OF DISCHARGE

OCCUPATION

ADDRESS

CHIEF COMPLAINTS

HISTORY OF PRESENTING ILLNESS

PAST HISTORY

Hypertension

Diabetes

IHD

T.B

Bronchial asthma

Bleeding disorders

Any Previous thoracoscopic surgery

History of smoking

COPD

GENERAL PHYSICAL EXAMINATION

-Vitals

BP PR TEMP RR

Signature of Candidate **Signature of Supervisor**

SYSTEMIC EXAMINATION

- RESPIRATORY EXAMINATION
  - -Inspection
  - -Palpation
  - -Percussion
  - -Auscultation

INVESTIGATIONS:

CHEST X-RAY:

CECT CHEST (DATE_____):-

ABG:

PFT:

PTI:

INR:

BT/CT:

CLINICAL DIAGNOSIS

PERIOPERATIVE PERIOD

- Surgery Performed
- Anesthesia
- Intraoperative findings

- Duration of surgery
- Intraoperative blood loss
- Conversion of vats to open thoracotomy – yes/no
- If yes the reasons for conversion
- Intraoperative complication if any
- Biopsy – taken/not taken

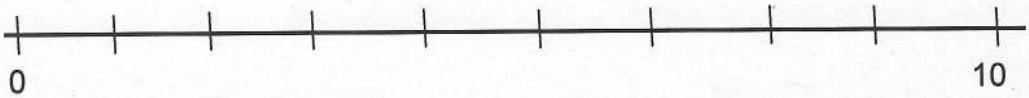
Signature of Candidate **Signature of Supervisor**

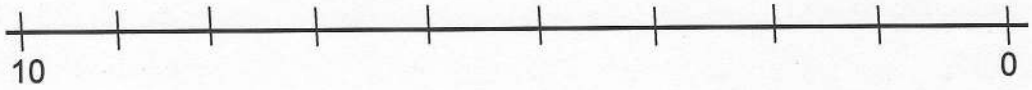
POSTOPERATIVE PERIOD

1. Post-operative pain and analgesic requirement

- Pain by visual analogue scale at :-

Visual Analogue pain scale





0 POD

3rd POD

7th POD

1 Month

2) Duration of post- operative hospital stay

3) Time to return to work

4) Biopsy report (if taken)

5) Prolonged air leak (more than 7 days)

6) Wound complications like sinus formation, wound dehiscence.

7) Neuropathic pain

PARAMETERS	PRE-OPERATIVE	POST-OPERATIVE
CHEST X RAY		
PFT		
ABG		
DYSPNEA GRADING		

FINAL OUTCOME:

Cured/Symptomatic Relief/No Relief/Recurrence/Mortality

Signature of Candidate **Signature of Supervisor**

S.NO.	NAME	MRD no.	AGE	AGEGRP	GENDER	WEIGHT	HEIGHT	Pre OP FEV1 PREDICTED	Pre OP FEV1 %PREDICTED
1	BB	1183657	66	6	m	88	181	4.278	55
2	RK	1290342	35	3	m	74	181	4.25	55
3	ND	1185320	54	5	f	71	165	-	-
4	SS	1287043	24	2	m	71	182	4.61	66
5	AK	1295923	45	4	f	78	161	-	-
6	RK	1290342	56	5	m	79	172	-	-
7	AK	1199618	58	5	f	61	157	2.52	56
8	MK	1156445	47	4	m	72	169	-	-
9	SP	1253184	22	2	m	79	182	-	-
10	LS	1328825	41	4	m	75	178	3.69	80
11	RK	1309600	42	4	m	74	178	3.92	61
12	JS	1345322	47	4	m	81	174	-	-
13	JS	1331051	62	6	m	89	182	-	-
14	NK	1361131	68	6	m	82	176	-	-
15	SS	1159775	50	5	m	87	180	-	-
16	JS	1377239	44	4	m	77	181	3.99	61
17	R	1020417	21	2	m	76	182	4.7	55
18	TK	978266	55	5	m	81	183	4.71	80
19	RC	1320536	48	4	m	85	181	4.42	71
20	HS	1135298	40	4	m	90	180	-	-
21	K	1169913	22	2	m	91	179	4.86	73
22	LS	1116828	45	4	m	87	175	-	-
23	SS	908787	38	3	m	77	179	-	-
24	LS	1328825	24	2	m	72	178	-	-
25	SK	1199048	40	4	m	75	179	-	-
26	JS	613471	30	3	m	80	181	-	-
27	KS	1187878	37	3	M	85	179	5.478	56
28	AS	865191	37	3	m	71	179	5.45	56
29	GS	1278565	22	2	f	68	163	-	-
30	GS	1278565	26	2	m	68	180	5.81	67
31	N	1123465	20	1	f	75	159	-	-
32	SL	1373938	70	6	m	76	170	-	-
33	CK	1163363	45	4	f	58	155	3.72	57
34	HS	701798	39	3	m	69	167	-	-
35	JS	1200310	24	2	m	76	180	-	-
36	JS	1217035	43	4	m	72	176	4.89	81
37	PK	899988	44	4	m	71	176	5.12	62
38	RK	1196453	49	4	m	78	172	-	-
39	TP	1099386	64	6	m	86	180	-	-
40	BS	1056553	70	6	m	79	174	-	-
41	GS	1179281	19	1	m	84	178	-	-
42	S	1313260	20	1	m	74	177	-	-
43	P	1290249	20	1	f	71	165	-	-

S.NO.	Pre OP FVC PREDICTED	Pre OP FVC % PREDICTED	Pre OP fev1/fvc	Pre OP PaO2	Pre OP PaCO2
1	5.1441	61	74.98	56	49
2	5.15	61	74.98	56	49
3	-	-	-	61	45
4	5.5	72	74.09	68	42
5	-	-	-	72	43
6	-	-	-	55	37
7	2.94	60	80.01	65	49
8	-	-	-	78	37
9	-	-	-	72	42
10	4.77	78	88.68	74	40
11	4.8	77	65.36	61	39
12	-	-	-	55	37
13	-	-	-	61	45
14	-	-	-	68	46
15	-	-	-	58	43
16	4.92	66	76.64	72	45
17	5.57	67	69.22	61	41
18	5.6	71	94.59	73	42
19	5.17	80	76.98	79	40
20	-	-	-	64	39
21	5.48	71	83.83	69	38
22	-	-	-	60	48
23	-	-	-	59	39
24	-	-	-	63	46
25	-	-	-	78	39
26	-	-	-	86	38
27	6.0441	67	77.28	58	48
28	6.05	67	77.28	58	48
29	-	-	-	63	44
30	6.4	78	76.39	70	41
31	-	-	-	74	42
32	-	-	-	57	36
33	3.84	66	82.31	67	48
34	-	-	-	80	36
35	-	-	-	74	41
36	5.67	84	90.98	76	39
37	5.7	83	67.66	63	38
38	-	-	-	57	36
39	-	-	-	63	44
40	-	-	-	70	45
41	-	-	-	60	42
42	-	-	-	61	38
43	-	-	-	61	45

S.NO.	Post op FEV1 PREDICTED	Post op FEV1 %PREDICTED	Post op FVC PREDICTED
1	4.278	56	5.1441
2	4.25	65	5.15
3	-	-	-
4	4.61	79	5.5
5	-	-	-
6	-	-	-
7	2.52	66	2.94
8	-	-	-
9	-	-	-
10	3.69	89	4.77
11	3.92	78	4.8
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	3.99	69	4.92
17	4.7	68	5.57
18	4.71	92	5.6
19	4.42	84	5.17
20	-	-	-
21	4.86	86	5.48
22	-	-	-
23	-	-	-
24	-	-	-
25	-	-	-
26	-	-	-
27	5.478	60	6.0441
28	5.45	69	6.05
29	-	-	-
30	5.81	83	6.4
31	-	-	-
32	-	-	-
33	3.72	70	3.84
34	-	-	-
35	-	-	-
36	4.89	93	5.67
37	5.12	82	5.7
38	-	-	-
39	-	-	-
40	-	-	-
41	-	-	-
42	-	-	-
43	-	-	-

S.NO.	Post op FVC % PREDICTED	Post op fev1/fvc	PaO2 Post OP	PaCO2 Post OP	STAY	breathlessness
1	60	77.62	57	45	4	Yes
2	80	77.62	57	45	4	Yes
3	-	-	63	44	4	Yes
4	81	88.83	75	41	5	Yes
5	-	-	69	40	4	Yes
6	-	-	68	36	5	No
7	82	80.83	70	41	4	Yes
8	-	-	80	39	6	Yes
9	-	-	84	40	4	Yes
10	85	90.53	81	39	4	Yes
11	81	73.33	64	40	4	No
12	-	-	58	37	4	Yes
13	-	-	61	45	4	Yes
14	-	-	72	40	5	Yes
15	-	-	63	38	3	No
16	75	100.02	75	44	6	Yes
17	76	93.2	69	41	4	Yes
18	73	108.79	46	42	4	Yes
19	84	82.61	84	37	4	No
20	-	-	66	40	12	Yes
21	78	83.62	69	34	4	Yes
22	-	-	67	47	11	Yes
23	-	-	69	39	7	Yes
24	-	-	61	42	5	Yes
25	-	-	83	35	5	Yes
26	-	-	88	36	4	Yes
27	76	87.28	61	46	4	Yes
28	80	89	61	46	4	Yes
29	-	-	66	42	4	Yes
30	81	90	73	39	5	Yes
31	-	-	77	40	4	Yes
32	-	-	60	34	5	No
33	87	93	70	46	4	Yes
34	-	-	83	34	6	Yes
35	-	-	77	39	4	Yes
36	91	99	79	37	4	Yes
37	81	79	66	36	4	No
38	-	-	60	34	4	Yes
39	-	-	66	42	4	Yes
40	-	-	73	43	5	Yes
41	-	-	63	40	3	No
42	-	-	64	36	7	Yes
43	-	-	63	44	4	Yes

S.NO.	chest pain	cough	fever	duration	HTN	DIAB	IHD	TB	B ASTHMA	BLD DSRD	ICD	SMOKING
1	Yes	No	No	4	No	No	No	No	No	No	No	Yes
2	Yes	No	No	4	No	No	No	No	No	No	No	No
3	No	Yes	No	20	No	No	No	Yes	No	No	No	No
4	No	No	No	2	No	No	No	No	No	No	Yes	No
5	Yes	No	No	5	No	No	No	No	No	No	No	Yes
6	Yes	No	No	4	No	No	No	No	No	No	Yes	No
7	No	No	No	1	No	No	No	No	No	No	No	Yes
8	Yes	No	No	15	No	No	No	No	No	No	No	No
9	No	No	No	2	No	Yes	No	No	No	No	No	No
10	No	No	No	1	No	No	No	No	No	No	No	No
11	Yes	No	No	4	No	No	No	No	No	No	No	Yes
12	Yes	No	No	5	No	No	No	No	No	No	No	Yes
13	Yes	No	No	4	Yes	No	No	No	No	No	Yes	No
14	Yes	No	No	4	No	No	Yes	No	No	No	No	No
15	Yes	No	No	4	Yes	Yes	No	No	No	No	No	No
16	Yes	No	No	4	No	No	No	No	No	No	No	Yes
17	Yes	No	No	4	No	No	No	No	No	No	No	No
18	Yes	No	No	5	No	No	No	No	No	No	No	No
19	Yes	No	No	5	No	No	No	No	No	No	No	No
20	Yes	No	No	15	No	No	No	No	No	No	Yes	Yes
21	No	Yes	Yes	60	No	Yes	No	Yes	No	No	No	No
22	No	No	No	4	No	No	No	No	No	No	No	No
23	No	No	Yes	4	No	No	No	No	No	No	No	No
24	No	No	No	2	No	No	No	No	No	No	Yes	No
25	No	No	No	4	No	No	No	No	No	No	No	No
26	Yes	Yes	Yes	30	No	No	No	No	No	No	Yes	No
27	Yes	No	No	5	No	No	No	No	No	No	No	No
28	Yes	No	No	4	No	No	No	No	No	No	No	No
29	No	Yes	No	18	No	No	No	Yes	No	No	No	No
30	No	No	No	2	No	No	No	No	No	No	Yes	No
31	Yes	No	No	6	No	No	No	No	No	No	No	Yes
32	Yes	No	No	3	No	No	No	No	No	No	Yes	No
33	No	No	No	2	No	No	No	No	No	No	No	Yes
34	Yes	No	No	19	No	No	No	No	No	No	No	No
35	No	No	No	2	No	Yes	No	No	No	No	No	No
36	No	No	No	1	No	No	No	No	No	No	No	No
37	Yes	No	No	5	No	No	No	No	No	No	No	Yes
38	Yes	No	No	4	No	No	No	No	No	No	No	Yes
39	Yes	No	No	3	Yes	No	No	No	No	No	Yes	No
40	Yes	No	No	3	No	No	Yes	No	No	No	No	No
41	Yes	No	No	4	Yes	Yes	No	No	No	No	No	No
42	No	No	Yes	4	No	No	No	No	No	No	No	No
43	No	Yes	No	20	No	No	No	Yes	No	No	No	No

S.NO.	COPD	CECT CHEST	laterality	CD	PROCEDURE
1	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
2	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
3	No	tubercular empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
4	No	hydropnuemothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
5	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
6	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
7	No	pneumothorax with empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
8	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
9	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
10	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
11	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
12	No	hydropnuemothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
13	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
14	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
15	No	pneumothorax with empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
16	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
17	Yes	pneumothorax with empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
18	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
19	No	hydropnuemothorax with empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
20	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
21	No	tubercular empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
22	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
23	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
24	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
25	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
26	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
27	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
28	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
29	No	tubercular empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
30	No	hydropnuemothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
31	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
32	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
33	No	pneumothorax with empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
34	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
35	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
36	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
37	No	EMPYEMA THORACIS	left	EMPYEMA THORACIS	VATS DECORTICATION
38	No	hydropnuemothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
39	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
40	No	pneumothorax with empyema	left	EMPYEMA THORACIS	VATS DECORTICATION
41	No	pneumothorax with empyema	right	EMPYEMA THORACIS	VATS DECORTICATION
42	No	EMPYEMA THORACIS	right	EMPYEMA THORACIS	VATS DECORTICATION
43	No	tubercular empyema	right	EMPYEMA THORACIS	VATS DECORTICATION

S.NO.	INTRAOPERATIVE FINDINGS
1	THICK FIBROSED LAYER OVER VISCERAL PLEURA WITH PURULENT FLUID IN PLEURAL CAVITY
2	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
3	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH PURULENT COLLECTION
4	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
5	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
6	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
7	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
8	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
9	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
10	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
11	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
12	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
13	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
14	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
15	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
16	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
17	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
18	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
19	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
20	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
21	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
22	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
23	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
24	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
25	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
26	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
27	THICK FIBROSED LAYER OVER VISCERAL PLEURA WITH PURULENT FLUID IN LEFT PLEURAL CAVITY
28	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
29	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH PURULENT COLLECTION
30	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
31	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
32	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
33	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
34	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
35	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
36	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH DENSE ADHESIONS
37	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
38	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
39	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
40	LEFT EMPYEMA THORACIS WITH THICKENED PLEURA
41	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
42	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA
43	RIGHT EMPYEMA THORACIS WITH THICKENED PLEURA WITH PURULENT COLLECTION

S.NO.	BLD LOSS(ML)	DURATION(MIN)	CONVERSION	REASON
1	80	80	NO	-
2	40	50	no	-
3	40	50	no	-
4	30	45	no	-
5	70	80	no	-
6	30	70	no	-
7	50	70	no	-
8	200	180	yes	thick peel
9	50	70	no	-
10	40	60	no	-
11	45	60	no	-
12	50	70	no	-
13	110	90	no	-
14	60	90	no	-
15	60	80	no	-
16	35	50	no	-
17	60	60	no	-
18	50	50	no	-
19	60	90	no	-
20	200	140	yes	DENSE adhesions
21	30	60	no	-
22	50	70	no	-
23	50	80	no	-
24	30	60	no	-
25	30	70	no	-
26	50	70	no	-
27	80	80	NO	-
28	50	50	no	-
29	40	50	no	-
30	30	45	no	-
31	70	80	no	-
32	30	70	no	-
33	50	70	no	-
34	180	200	yes	thick peel
35	50	70	no	-
36	40	60	no	-
37	45	60	no	-
38	50	70	no	-
39	100	90	no	-
40	60	90	no	-
41	60	80	no	-
42	50	80	no	-
43	40	50	no	-

S.NO.	CXR pre op	CXR post op	DYSPNEA INDEX pre op
1	PLEURAL EFFUSION WITH PNEUMOTHORAX	EXPANDED LUNG	4
2	PLEURAL EFFUSION	EXPANDED LUNG	4
3	HYDROPNEUMOTHORAX	EXPANDED LUNG	5
4	HYDROPNEUMOTHORAX WITH ICD	EXPANDED LUNG	5
5	PNEUMOTHORAX	EXPANDED LUNG	4
6	PNEUMOTHORAX WITH ICD	EXPANDED LUNG	4
7	PNEUMOTHORAX	EXPANDED LUNG	2
8	PLEURAL EFFUSION	partially EXPANDED LUNG	4
9	PLEURAL EFFUSION	EXPANDED LUNG	4
10	PLEURAL EFFUSION	EXPANDED LUNG	4
11	PLEURAL EFFUSION	EXPANDED LUNG	4
12	HYDROPNEUMOTHORAX	EXPANDED LUNG	2
13	PNEUMOTHORAX WITH ICD	partially EXPANDED LUNG	4
14	PNEUMOTHORAX	EXPANDED LUNG	5
15	PNEUMOTHORAX	EXPANDED LUNG	4
16	PLEURAL EFFUSION	EXPANDED LUNG	2
17	PNEUMOTHORAX	EXPANDED LUNG	4
18	PLEURAL EFFUSION	EXPANDED LUNG	4
19	HYDROPNEUMOTHORAX	EXPANDED LUNG	4
20	PNEUMOTHORAX WITH ICD	partially EXPANDED LUNG	2
21	PLEURAL EFFUSION	EXPANDED LUNG	5
22	PLEURAL EFFUSION	EXPANDED LUNG	5
23	PLEURAL EFFUSION	EXPANDED LUNG	4
24	PLEURAL EFFUSION WITH ICD	EXPANDED LUNG	5
25	PLEURAL EFFUSION	EXPANDED LUNG	4
26	PLEURAL EFFUSION WITH ICD	EXPANDED LUNG	5
27	HYDROPNEUMOTHORAX	EXPANDED LUNG	4
28	PLEURAL EFFUSION	EXPANDED LUNG	4
29	PLEURAL EFFUSION WITH PNEUMOTHORAX	EXPANDED LUNG	5
30	HYDROPNEUMOTHORAX WITH ICD	EXPANDED LUNG	5
31	PNEUMOTHORAX	EXPANDED LUNG	4
32	PNEUMOTHORAX WITH ICD	EXPANDED LUNG	4
33	PNEUMOTHORAX	EXPANDED LUNG	2
34	PLEURAL EFFUSION	partially EXPANDED LUNG	4
35	PLEURAL EFFUSION	EXPANDED LUNG	4
36	PLEURAL EFFUSION	EXPANDED LUNG	4
37	PLEURAL EFFUSION	EXPANDED LUNG	4
38	HYDROPNEUMOTHORAX	EXPANDED LUNG	2
39	PNEUMOTHORAX WITH ICD	partially EXPANDED LUNG	4
40	PNEUMOTHORAX	EXPANDED LUNG	5
41	PNEUMOTHORAX	EXPANDED LUNG	4
42	PLEURAL EFFUSION	EXPANDED LUNG	4
43	HYDROPNEUMOTHORAX	EXPANDED LUNG	5

S.NO.	dyspnea index post op	POST OPERATIVE PAIN day 1	POD 3	POD 7	I MONTH	3 MONTHS
1	1	6	3	0	0	0
2	1	6	3	0	0	0
3	1	6	3	0	0	0
4	1	6	2	0	0	0
5	1	6	3	1	0	0
6	1	6	3	1	0	0
7	1	7	3	1	0	0
8	1	8	5	3	0	0
9	1	7	3	0	0	0
10	1	6	2	0	0	0
11	1	7	2	0	0	0
12	1	7	4	1	0	0
13	1	6	1	0	0	0
14	1	7	4	1	0	0
15	2	6	3	0	0	0
16	1	7	4	1	0	0
17	1	7	2	0	0	0
18	1	6	2	0	0	0
19	1	6	1	1	0	0
20	1	8	4	2	0	0
21	1	6	2	0	0	0
22	1	7	2	0	0	0
23	1	6	2	1	0	0
24	1	6	2	0	0	0
25	1	6	1	1	0	0
26	1	6	2	0	0	0
27	1	6	3	0	0	0
28	1	6	3	0	0	0
29	1	6	3	0	0	0
30	1	6	2	0	0	0
31	1	6	3	1	0	0
32	1	6	3	1	0	0
33	1	7	3	1	0	0
34	1	8	5	3	0	0
35	1	7	3	0	0	0
36	1	6	2	0	0	0
37	1	7	2	0	0	0
38	1	7	4	1	0	0
39	1	6	1	0	0	0
40	1	7	4	1	0	0
41	2	6	3	0	0	0
42	1	6	2	1	0	0
43	1	6	3	0	0	0

S.NO.	TIME TO WORK	BIOPSY REPORT	PROLONGED AIR LEAK	POST OP Negative suction
1	7	LUNG ABSCESS	NO	No
2	7	pneumonitis with empyema	NO	No
3	8	empyema	NO	No
4	8	LUNG ABSCESS	NO	No
5	9	empyema	NO	No
6	12	LUNG ABSCESS	NO	No
7	10	pneumonitis with empyema	NO	No
8	15	empyema	yes	Yes
9	10	empyema	NO	No
10	7	LUNG ABSCESS	NO	No
11	8	empyema	NO	No
12	8	pneumonitis with empyema	NO	No
13	12	empyema	NO	Yes
14	15	LUNG ABSCESS	NO	No
15	10	empyema	NO	No
16	8	empyema	NO	No
17	7	empyema	NO	No
18	7	empyema	NO	No
19	8	empyema	NO	No
20	15	empyema	yes	Yes
21	10	tuberculosis with empyema	NO	No
22	8	empyema	NO	No
23	7	LUNG ABSCESS	NO	No
24	10	empyema	NO	No
25	10	empyema	NO	No
26	8	pneumonitis with empyema	NO	No
27	8	LUNG ABSCESS	NO	No
28	8	pneumonitis with empyema	NO	No
29	7	empyema	NO	No
30	7	LUNG ABSCESS	NO	No
31	8	empyema	NO	No
32	13	LUNG ABSCESS	NO	No
33	12	pneumonitis with empyema	NO	No
34	14	empyema	yes	Yes
35	11	empyema	NO	No
36	8	LUNG ABSCESS	NO	No
37	7	empyema	NO	No
38	7	pneumonitis with empyema	NO	No
39	12	empyema	NO	Yes
40	15	LUNG ABSCESS	NO	No
41	10	empyema	NO	No
42	7	LUNG ABSCESS	NO	No
43	8	empyema	NO	No

S.NO.	POST OP Negative suction (days)	WOUND COMPLICATIONS
1	-	NO
2	-	NO
3	-	NO
4	-	NO
5	-	NO
6	-	NO
7	-	NO
8	5	NO
9	-	NO
10	-	NO
11	-	NO
12	-	NO
13	2	NO
14	-	NO
15	-	NO
16	-	NO
17	-	NO
18	-	NO
19	-	NO
20	5	NO
21	-	NO
22	-	NO
23	-	NO
24	-	NO
25	-	NO
26	-	NO
27	-	NO
28	-	NO
29	-	NO
30	-	NO
31	-	NO
32	-	NO
33	-	NO
34	5	NO
35	-	NO
36	-	NO
37	-	NO
38	-	NO
39	2	NO
40	-	NO
41	-	NO
42	-	NO
43	-	NO

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No. BFUHS/2K21p-TH/ 125 Date 25/11/2021

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Gurkaran Singh**, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

To study clinical profile and outcomes of video assisted thoracoscopic decortication in empyema thoracis.

Supervisor

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Co-Supervisor

Dr. Atul Mishra
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The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

127. If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.

128. The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.

TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SURGERY

In

GENERAL SURGERY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

MARCH 2021

DR. GURKARAN SINGH

DEPARTMENT OF GENERAL SURGERY
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA
LUDHIANA, PUNJAB-141001

ABSTRACT OF PLAN OF THESIS

Title	TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS
For the degree of	M.S. General Surgery
Name of the candidate	Dr Gurkaran Singh
Supervisor	Dr. Amandeep Singh Nar, Associate Professor, Department of Surgery, DMC&H, Ludhiana
Co-supervisor	Dr. Atul Mishra, Professor , Department of Surgery , DMC&H, Ludhiana Dr. Ravinder Pal Singh, Professor , Department of Surgery , DMC&H, Ludhiana
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Empyema thoracis is defined as the collection of purulent fluid in the pleural space. Pus in the pleural space can't be coughed out. Instead, it needs to be drained by a needle or surgery.

Aim of Study: To study clinical profile and outcomes of video assisted thoracoscopic decortication in empyema thoracis

Materials & methods: This study will be conducted in department of surgery, Dayanand Medical College and Hospital for one and a half year. All the patients will be informed about the procedure of VATS in detail and surgery will be performed after taking written and informed consent from each patient. Relevant present and past history will be recorded. Intraoperative and post operative data will be collected for all patients and data will be recorded in proforma for analysis and interpretation of data.

Clinical Significance: To study clinical profile and outcomes of video assisted thoracoscopic decortication in empyema thoracis including the intraoperative and postoperative complications and 30 days follow up.

Keywords: Video Assisted Thoracoscopic Surgery (VATS)
Video Assisted Thoracoscopic Decortication (VATD)

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS"** exist in the Department of Surgery, DMC&H, and Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate herself under our supervision and guidance.

Supervisor

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Date : _____

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Gurkaran Singh
Department	General Surgery
Topic of Thesis	TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS
Likely date of appearing in PG examination	MAY 2023
Date of enrollment	26th July, 2020
Name of Head of Department	Dr. Jaspal Singh
1) **Supervisor** 2) **Co-Supervisor**	Dr. Amandeep Singh Nar Dr. Atul Mishra Dr. Ravinder Pal Singh
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
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	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / No

Dr. Sandeep Puri
Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairman
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	DR. GURKARAN SINGH HIG- 1651, Sector 70, SAS Nagar, Mohali
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL
3	COURSE OF STUDY AND SUBJECT	MS GENERAL SURGERY
4	DATE OF ADMISSION OF COURSE	26TH JULY 2020
5	TITLE OF THE TOPIC	TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

An empyema is defined as pus in the pleural cavity that mainly occurs with pneumonia or secondary to chest trauma, and can also occur as a complication of any thoracic operation. Approximately half of the patients with pneumonia develop pleural effusion, and 5–10% of patients may develop empyema thoracis after antibiotic treatment.[1] Empyema usually follows pneumonia and three phases are described:

1. In the exudative phase, there is protein rich effusion. If this becomes infected then the scene is set for empyema. At this stage, antibiotics may be all that is required. Aspiration or drainage to dryness in addition is preferred.
2. Over the next days, the fluid thickens to what is known as the fibro purulent phase. Drainage at this stage is prudent as antibiotics alone are unlikely to be curative,
3. The organizing phase causes the lung to be trapped by a thick peel or cortex for which surgical management may be required. [2]Empyema remains the most common complication of pneumonia with a reported mortality rate between 10% and 20%, despite the use of antibiotics and different pneumococcal vaccines and improvement of the minimally invasive surgical techniques.[3] Recent studies show that the use of a chest tube as the first-line treatment still needs further examination.[4,5] A cohort study in 2018 characterized the higher readmission and reintervention rates in patients with thoracic empyema treated with chest tubes, and suggested earlier surgical intervention.[5]

Many surgical techniques have been employed in the treatment of empyema including debridement via VATS, decortication, thoracoplasty and open window thoracostomy.[6] Debridement via VATS has gained popularity from the mid 1990s [7] and its Success rate ranges from 68% to 93%.[6] The success rate of VATS debridement very much depends on the stage of parapneumonic effusion (PPE) and the more patients in the organizing phase the higher the failure rate. [8] Decortication is the method of choice when the underlying lung is

unable to expand due to the thick inflammatory coat and the patient is fit for major surgery. Decortication has been shown to substantially improve both vital capacity and forced expiratory volume in the first second. Thoracoplasty entails remodelling of the osteomuscular wall of the thoracic cage in order to control the underlying inflammatory process but is rarely done these days.[6] Another operative procedure—open window thoracostomy— is performed in debilitated patients when thoracoplasty is not an alternative and when VATS has failed to control the disease. It can be done as a definite procedure with intent to cure, as a last resort procedure when other treatment has failed to achieve a relatively stable state or as a preliminary procedure prior to definite treatment. [6]

Technological advancements in video endoscopy in the past decade have enabled the re-introduction of thoracoscopy in the form of video assisted thoracoscopic surgery (VATS) with much wider clinical applications. The advances that have played key parts in the transformation include, the development of micro cameras and rod lens technology permitting a panoramic view of the hemithorax (instead of previous tunnel like vision); evolution of general anaesthetic technique to allow one lung ventilation thereby permitting free maneuverability of the telescope and instruments within the pleural cavity; and availability of specialized endoscopic surgical instruments.

VATS is now regarded by many surgeons to be the gold standard in the surgical management of a variety of thoracic conditions, such as empyema thoracis, spontaneous pneumothorax, pleural diseases. Video-assisted thoracoscopic surgery (VATS) is a minimally invasive surgical technique used to diagnose and treat problems in your chest.

During a VATS procedure, a tiny camera (thoracoscope) and surgical instruments are inserted into your chest through one or more small incisions in your chest wall. The thoracoscope transmits images of the inside of your chest onto a video monitor, guiding the surgeon in performing the procedure.

VATS, initially used for diagnostic purpose is now utilized for therapeutic purposes as VATS decortication found effective for stage II and III empyema thoracis after failure of chest tube thoracostomy.[9] Finally, its effectiveness in treating multiloculated and chronic empyema has also been addressed. There is growing evidence to suggest that VATS is a safe and feasible operation associated with improved perioperative outcomes compared to conventional open thoracotomy.[10]

6.2 REVIEW OF LITERATURE

VATS surgeons worldwide have generally attributed the origination of thoracoscopic therapy to the Swedish physician Hans Christian Jacobaeus (Jacobaeus, 1910).[11] Towards the end of the 19th century, he first used a modified cystoscope to examine the pleural cavity under local anesthesia. Using a simple candle as a light source, Jacobaeus peered through the rigid tube to look inside the chest.

Surgical access for the management of pneumothorax can be performed via open techniques (usually axillary or lateral thoracotomy) or by minimal access VATS. The success of VATS in the treatment of pneumothorax has led to earlier referral by physicians and increased acceptance by patients for surgery. The experience so far shows that VATS procedures in elderly (75 years) patients are safe with low postoperative pulmonary complications.[12]

In addition, VATS can also be a useful approach in selected cases in the pediatric population for a variety of endoscopic procedure. [13] There is increasing evidence to associate VATS with less access trauma and quicker recovery, with many realizing that trauma from access is often worse than the surgery for correction.

Postoperative pro-inflammatory cytokine levels were lower [14] and T cell subgroups as well as natural killer cells were less suppressed after VATS compared with their open counterparts.[15] In addition, patients undergoing VATS required significantly less postoperative parenteral narcotics and pain medications than open techniques.[14]

VATS initially used for diagnostic purpose, is a minimally invasive surgical procedure now utilized for therapeutic purposes as VATS decortication found effective for empyema thoracis.[9] With surgical advances and experience in VATS, some studies have reported that VATS decortication is at least equivalent to open decortications with regard to resolution to symptoms.[16]

Advantages of VATS over open decortications include reduced post operative pain, shorter duration of hospitalization, decreased blood loss, and faster recovery of pulmonary function, lower incidence of wound infection and lower 30 days morbidity and mortality rate.[17]

In empyema thoracis, decision of early intervention with VATS drainage or decortication has shown better results compared to prolonged conservative management with ICD placement or fibrinolytics, because rapid progression of disease can be halted by early interventions.[18] In recent era, VATS decortication has become one of the most important and effective minimally invasive treatment modality for these cases of stage I and II empyema thoracis.[19]

According to study conducted by Ravikant Thori et al , surgical intervention for late-stage empyema thoracis with VATS decortication has shown advantages in terms of shorter hospital stay, less postoperative pain and low complication rate with better outcome and early recovery.[20] VATS drainage and pleurectomy is associated with good outcomes with reduced recurrence rates after failure of conservative management. In stage II and stage III empyema thoracis, VATS decortication may be preferred owing to good outcomes and reduced morbidity and mortality rates. In stage III empyema, appropriate timing of VATS decortication is the key factor to decrease conversion rates and hasten recovery. With increasing experience and improved surgical skills in minimally invasive surgery as well as better instrumentation and anaesthesia techniques, the conversion rate of VATS decortication to open thoracotomy will further decrease.

One particular advantage of a VATS approach is that it does not necessarily require a general anaesthesia. This is of particular importance in unstable patients with multiple comorbidities or in patients allergic to general anaesthesia. Rare reports have demonstrated that VATS decortication could effectively manage empyema in awake patients using epidural or paravertebral nerve block.[21,22] It was even suggested that spontaneous lung ventilation resulted in easier dissection during the operation, resulting in lower post-operative morbidity.

Chan et al. compared 71 cases of empyema thoracis (75% stage 3), treated with either VATS Decortication (*n*=41) or Open decortication (OD) (*n*=36). And concluded that VATS had shorter operative time (2.5 vs. 3.8 h; *P*<0.001), less postoperative pain (*P*=0.04), greater

satisfaction with the wounds (*P*<0.0001), and greater satisfaction with the operation overall (*P*=0.006). He also concluded that no patients were converted from VATS to OD and there was no need of re-intervention in both groups.[23] Similar study conducted by Tong et al in 420 patients with empyema, out of which 326 patients underwent VATS decortication and 94 patients underwent open decortication and concluded that 11.4% of VATS cases were converted to thoracotomy. The VATS decortication group had reduced hospital stays (15 vs. 21 days; *P*=0.03) and significantly reduced postoperative complications and 30-day mortality (*P*=0.02).[24] Various studies conducted to comprehend the superiority of VATS decortication to open decortication and one of the prospective study conducted by Waller and Rengarajan found VATS to be successful in 58% of cases (*n*=21) (compared to open surgery; *P*=0.001) and significantly reduced hospital stay (mean 2.9 days; *P*=0.004).[25] and another similar study conducted by Cardillo et al reported that VATS (*n*=185) having significantly better results than Open Decortication (*n*=123) in terms of operative time (*P*<0.0001), pain (*P*<0.0001), postoperative air-leak (*P*=0.004), hospital stay (*P*=0.020) and time to return to work (*P*<0.0001). Conversion rate to open surgery was 11/185 (5.9%). Additionally, re-operation [6/123 (4.8%) vs. 2/185 (1%); *P*=0.09] and mortality [4/123 (3.25%) vs. 0%] were lower in VATS vs. OD.[26]

Daniel T.L.Chan (2007) compared the radiologic and functional outcomes of decortication in 77 patients who underwent VATS and thoracotomy for empyema thoracis. 41 patients underwent and the thoracotomy approach in 36 patients. Patients in the two groups had similar preoperative demographic and clinical features. No patients required conversion from VATS to thoracotomy or reintervention for empyema. Intraoperative blood loss, duration of chest drain, lengths of hospital stay, and postoperative complication rates were all similar in the two groups. The mean operation time in the VATS group was significantly shorter (2.5 versus 3.8 hours, $p < 0.001$). Decortication using both approaches gave similar degrees of postoperative radiologic and functional improvements. Of the 42 patients available for follow-up,

the 21 who received the VATS approach reported significantly less postoperative pain ($p = 0.04$), greater satisfaction with the wounds ($p < 0.0001$), and greater satisfaction with the operation overall ($p = 0.006$).[27]

F Vyhnánek conducted a retrospective study in 165 patients who underwent surgery for thoracic empyema. 52 patients underwent VATS, and conversion to open decortication was required in 23 of them. Open decortication was performed in 113 subjects. VATS was successful in stage II disorders, in particular in the removal of pus and fibrin, with targeted chest drain insertion. VATS decortication was performed in 15 subjects with stage II or early stage III disorders. In open decortications, the procedure was extended to lung resection (8x lobectomy and 10x wedge non-anatomical resection) for residual abscess pneumonia or lung abscess. Postoperative complications that were managed conservatively included protracted chest drain air leak (11 patients) and fluidothorax relapses which were treated with redrainage (8 patients). Early postoperative rethoracotomy was indicated in 6 patients for hemothorax, resulting from hemocoagulation disorder in septic conditions. 4 patients were indicated for rethoracotomy for empyema relapses. During the postoperative period, 6 patients exited in the open decortication group. [28]

Farhan Ahmed Majeed et al conducted study in 812 patients of thoracic empyema. Patients were aged between 1 to 80 years. 369 patients (45%) belong to young age group i.e. 21-40 years followed by 278 (34.2%) in 41-60 years, 118 (14.5%) in 1-20 years and 47 (5.8%) in 61-80 years age groups.. Five hundred and thirty-seven (66.1%) were males while 275 (33.9%) were females. 598 patients (73.6%) stayed for 5 days. Amongst patients undergoing VATS (n162), only 24 (14.9%) stayed in the hospital for >5 days while stay of the remaining 138 (85.1%) patients was <5 days.

Most common cause of empyema thoracis was tuberculosis (47.3%), followed by pneumonia (30.3%), post-trauma (11.8%), post-surgery (3.9%), and miscellaneous (6.7%). 650 patients (80%) underwent open thoracotomy, while 162 (20%) underwent VAT decortication. In order to

systematise the management strategy, an algorithm was designed for chronic empyema (Figure 1). Patients were broadly categorised into two main categories: category A consisted of patients of empyema without bronchopleural fistula (BPF), and category B consisted of those with BPF. Category A had generalised disease requiring standard circumhilar decortication and loculated empyema, which were managed with minithorcotomy and decortication. Amongst patients without fistula BPF, open thoracotomy decortication was done in 458 (56.4%), minithoracotomy decortication was done in 69 patients (8.5%). Category B patients were further subdivided into those with expandable lungs and those with unexpandable lungs. In empyema with BPF (expandable lung), 29 patients (3.6%) underwent decortications with primary repair of BPF followed by repair of BPF with muscle flap in 20 (2.5%), and repair of BPF with lung flap in 6 (0.7%). In non-expandable lung group with organised collapse consolidation, decortications with conventional thoracoplasty was done in 21 (2.6%), while 22 (2.7%) underwent decortication and tailored thoracoplasty with muscle flap. In the non-expandable lung group with either cavitatory lung disease, endobronchial symptoms or lung necrosis underwent decortications and lung resection either anatomical or non-anatomical with buttressing muscle flap (n=25, 3.1%). VATD was done in 162 cases, out of which 120 were of early empyema, 42 were of chronic empyema; and out of these chronic empyema, 22 required a utility thoracotomy with VATS.[29]

6.3 AIMS AND OBJECTIVES OF THE STUDY

To study the clinical profile and outcome of VATS decortication done for empyema thoracis.

7. MATERIALS AND METHODS

7.1 Source of Data

The study will be conducted in the department of surgery, Dayanand Medical College and Hospital, Ludhiana for a period of one and a half year i.e. 1st March 2021 to 31st August, 2022 including follow up of 1 month. Patients with empyema thoracis will be enrolled in the study and the role of video assisted thoracoscopic surgery will be assessed in them.

7.2 METHOD OF COLLECTION OF DATA

Information shall be collected through pre-designed proforma for each patient chosen to be a part of the study with detailed history, clinical examination.

INCLUSION CRITERIA-

1.Patients diagnosed with empyema thoracis.

2. Patients who are fit for VATS decortication

3. Age more than 18 years.

EXCLUSION CRITERIA-

The group of people having following contraindications to VATS and decortication will be excluded.

1. Markedly unstable or patients in shock
2. Extensive adhesions obliterating pleural space
3. Prior talc pleurodesis
4. Inability to tolerate single lung ventilation
5. Bleeding disorders
6. Severe COPD
7. Respiratory failure
8. Corpulmonale/pulmonary hypertension

Duration of study

The study will be conducted for a period of one and a half year i.e. 1st March 2021 to 31st August, 2022 including follow up of 1 month.

METHOD OF COLLECTION OF DATA:

We will conduct this study in the Department of General Surgery, DMCH Ludhiana, for a time period of one and half year with a period of 1 month follow up after taking approval from the ethical committee.

Patients undergoing VATD for empyema thoracis will be evaluated and final outcome will be noted in view of symptomatic improvement, cure, recurrence of symptoms, complications, conversion to open thoracotomy.

In this study we will compare pre and post-operative PFT, ABG, Chest X Ray and Hugh-Jones dyspnea grading [19]

Grade I – Patient's breathing is as good as that of other people of them own age and build during work, walking, and climbing hills or stairs.

Grade II – Patient is able to walk at pace with normal people of their own age and build on level ground, but is unable to keep up on hills or stairs.

Grade III- Patient is unable to keep up with normal people on level ground, but is able to walk about a mile or more at their own speed.

Grade IV – Patient is unable to walk more than about 50 yards on level ground without a rest.

Grade V- Patient is breathless on talking or undressing, or unable to leave their house because of breathlessness; Unspecified. Patient is unable to be classified into the above grades because of bedridden status.

Other parameters like operative time, intraoperative blood loss, duration of air leak and chest drains, post-operative hospital stays, atelectasis, intensive care unit stay, relapse/recurrence/readmission, case fatality and return to normal physical activity and work will also be considered, Written and informed consent will be taken from all patients going to be enrolled in this study.

Relevant present and past history will be recorded. Findings of general physical examination and specific systemic examination will be recorded in details along with investigations in the form of PFT, ABG, Chest X-Ray.

Clinical profile of patients will include: Age (in years), gender (male/female), body mass index (BMI), cardiovascular comorbidities (Myocardial infarction, angioplasty, valvular heart disease, heart failure, pace makers), diabetes, previous thoracic interventions, ASA grading, symptoms (dyspnea, fever, cough, chest pain, hemoptysis), duration of

symptoms (<3 weeks, > 3 weeks), etiology.

OUTCOME

Patient fulfilling the inclusion criteria will be evaluated prospectively with period of one month follow up and final outcome will be noted in view of:-

1. Symptomatic improvement – improvement of dyspnea, improvement of hemodynamic function, pain relief
2. Cure- no pneumothorax, full expansion lung and no empyema thoracis on chest imaging, no symptoms.
3. Complications - persistent air leak, bleeding from pulmonary vessels, post-operative re-expansion pulmonary edema, respiratory insufficiency following VATS.

STATISTICAL ANALYSIS

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Patients presenting included in the study will have to undergo hematological, biochemical or radiological investigations as per protocol. For this patient included in the study will be informed regarding their inclusion and written informed consent will be taken for all the patients included in the study.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached here with

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PROFORMA

Sr. No

MRD. NO.

NAME

AGE

SEX

ADM NO

DATE OF ADMISSION

DATE OF SURGERY

DATE OF DISCHARGE

OCCUPATION

ADDRESS

CHIEF COMPLAINTS

HISTORY OF PRESENTING ILLNESS

PAST HISTORY

Hypertension

Diabetes

IHD

T.B

Bronchial asthma

Bleeding disorders

Any Previous thoracoscopic surgery

History of smoking

COPD

GENERAL PHYSICAL EXAMINATION

-Vitals

BP PR TEMP RR

Signature of Candidate **Signature of Supervisor**

SYSTEMIC EXAMINATION

- RESPIRATORY EXAMINATION
  - -Inspection
  - -Palpation
  - -Percussion
  - -Auscultation

INVESTIGATIONS:

CHEST X-RAY:

CECT CHEST (DATE_____):-

ABG:

PFT:

PTI:

INR:

BT/CT:

CLINICAL DIAGNOSIS

PERIOPERATIVE PERIOD

- Surgery Performed
- Anesthesia
- Intraoperative findings

- Duration of surgery
- Intraoperative blood loss
- Conversion of vats to open thoracotomy – yes/no
- If yes the reasons for conversion
- Intraoperative complication if any
- Biopsy – taken/not taken

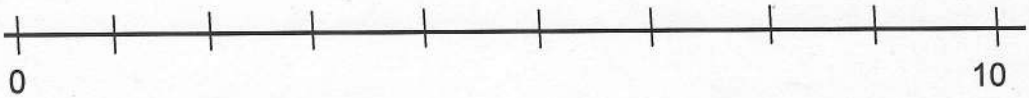
Signature of Candidate **Signature of Supervisor**

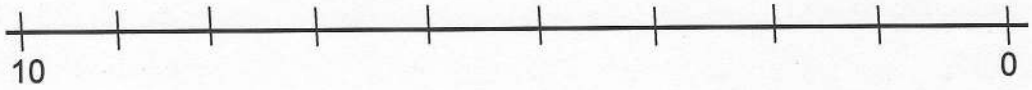
POSTOPERATIVE PERIOD

1. Post-operative pain and analgesic requirement

- Pain by visual analogue scale at :-

Visual Analogue pain scale





0 POD

3rd POD

7th POD

1 Month

2) Duration of post- operative hospital stay

3) Time to return to work

4) Biopsy report (if taken)

5) Prolonged air leak (more than 7 days)

6) Wound complications like sinus formation, wound dehiscence.

7) Neuropathic pain

PARAMETERS	PRE-OPERATIVE	POST-OPERATIVE
CHEST X RAY		
PFT		
ABG		
DYSPNEA GRADING		

FINAL OUTCOME:

Cured/Symptomatic Relief/No Relief/Recurrence/Mortality

Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o..... am willing to participate in the study **"TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

....

Signature of the Witness Signature of the patient

Name:

Signature of Candidate **Signature of Supervisor**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"TO STUDY CLINICAL PROFILE AND OUTCOMES OF VIDEO ASSISTED THORACOSCOPIC DECORTICATION IN EMPYEMA THORACIS" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ